

5010-A209 586



**FEASIBILITY REPORT**  
**ON**  
**NAVIGATION IMPROVEMENTS**  
**FOR**  
**MEXICO BEACH INLET**  
**MEXICO BEACH, FLORIDA**



**US Army Corps  
of Engineers**  
Mobile District

**DTIC**  
**ELITE**  
MAY 12 1989  
**S A D**

**MARCH 1989**

ENCLOSURE A  
For public release;  
Distribution Unlimited

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER COESAM/PDFC-89/02	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Feasibility Report on Navigation Improvements for Mexico Beach Inlet Mexico Beach, Florida		5. TYPE OF REPORT & PERIOD COVERED Feasibility Report March 1989
7. AUTHOR(s) Walter W. Burdin                      Kenneth P. Bradley Evelyn H. Brown                      Sandra P. Barrineau Susan I. Rees, PhD		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS U.S. Army Engineer District, Mobile Coastal Section, Planning Division (CESAM-PD-FC) P.O. Box 2288, Mobile, AL 36628-0001		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS CESAM-PD-FC P.O. Box 2288 Mobile, AL 36628-0001		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE March 1989
		13. NUMBER OF PAGES 266
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE N/A
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release, distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Navigation                      Sand Bypassing Mexico Beach                      Beach Erosion Feasibility		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The purpose of the study was to investigate the feasibility of the Federal government adopting, improving, and maintaining an existing navigation channel at Mexico Beach Inlet. Mexico Beach Inlet is located on the western edge of the City of Mexico Beach, Florida. It provides gulf access to a channel maintained by the city that extends inland north of Highway 98 and winds through residential neighborhoods. The city tries to maintain the channel to average dimensions approximating 5 Feet deep by 40 feet wide at an average annual cost of about \$50,000. Because of rapid shoaling in the entrance		

## 20. ABSTRACT (continued)

channel, clear access to the gulf can be maintained less than half of the time. Shoaling in the channel prevents many recreational and commercial boats from getting in and out of the channel. This results in lost recreational opportunities, lost fishing time, reduced revenues to charter craft, and reduced catches.

A number of alternative plans were considered but none proved to be economically feasible, primarily because of the large volume of littoral drift, 181,000 cubic yards per year, that must be handled to keep the channel open. It was recommended that no Federal action be taken at this time to adopt, improve, and maintain the existing navigation channel at Mexico Beach, Florida.

CESAD-PD-P (Mar 89) (10-1-7a) 1st End  
SUBJECT: Mexico Beach, Florida - 80825

Cdr, South Atlantic Division, Corps of Engineers, 77 Forsyth Street, S.W.,  
Room 313, Atlanta, Georgia 30335-6801 28 April 1989

FOR: Board of Engineers for Rivers and Harbors, Kingman Building, Fort  
Belvoir, Virginia 22060-5576

I concur in the recommendations of the District Engineer.



R. M. BUNKER  
Major General, USA  
Commanding

✓

3.
By:
Date:
App:
Dis:
AI

**FEASIBILITY REPORT**  
**ON**  
**NAVIGATION IMPROVEMENTS**  
**FOR**  
**MEXICO BEACH INLET**  
**MEXICO BEACH, FLORIDA**

## EXECUTIVE SUMMARY

This study was authorized by Section 102 of the 1966 River and Harbor Act (Public Law 89-789), approved 7 November 1966, and, in addition, a resolution adopted 23 June 1971 by the Committee on Public Works of the United States House of Representatives. The purpose of the study was to investigate the feasibility of the Federal government adopting, improving, and maintaining an existing navigation channel at Mexico Beach Inlet.

Mexico Beach Inlet is located on the western edge of the City of Mexico Beach, Florida. It provides gulf access to a channel maintained by the city that extends inland north of Highway 98 and winds through residential neighborhoods. The city tries to maintain the channel to average dimensions approximating 5 feet deep by 40 feet wide at an average annual cost of about \$50,000. Because of rapid shoaling in the entrance channel, clear access to the gulf can be maintained less than half of the time. Shoaling in the channel prevents many recreational and commercial boats from getting in and out of the channel. This results in lost recreational opportunities, lost fishing time, reduced revenues to charter craft, and reduced catches.

The study was conducted in accordance with the Principles and Guidelines for Water Resources and other authorities which define the goals and procedures for water resources planning. The design of the various channel alternatives was based on Corps of Engineers design standards for shallow draft channels for small vessels. A number of channel configurations and disposal options were considered, along with methods of protecting the entrance, such as jetties.

The older estimate of littoral drift, 75,000 cy annually, was used in the formulation of several plans of improvement in the earlier stages of the study. There was, however, a large and significant increase in the volume of littoral drift, to 181,000 cy, which resulted from calculations made by the US Army Corps of Engineers Coastal Engineering Research Center at the US Army Engineer Waterways Experiment Station. They estimated drift volume using information from the Wave Information Study.

Results of the early phases of the study using the lesser drift volume were recalculated when that revised estimate of 181,200 cy annually became available and other alternatives involving innovative methods of dredging contracting and purchase were developed and evaluated.

Despite consideration being given to a number of alternative plans, none proved to be economically feasible. Based on our analysis, it was recommended that no Federal action be taken at this time to adopt, improve, and maintain the existing navigation channel at Mexico Beach, Florida.

MEXICO BEACH, FLORIDA  
NAVIGATION IMPROVEMENTS FOR MEXICO BEACH INLET

TABLE OF CONTENTS

<u>ITEM</u>	<u>PAGE</u>
Introduction	1
Authority	1
Study Purpose and Scope	1
Prior Studies	2
Study Participants and Coordination	2
The Study Process	4
Problem Identification	4
Resource Management Problems	4
Existing Conditions	5
Study Area	5
Existing Navigation Channel	6
Economy and Development	8
Climate and Weather	9
Coastal Conditions	10
Problems and Needs	11
Navigation Problems	12
Vessel Characteristics and Operations	12
Recreation Vessels	12
Charter Cruiser and Charter Fishing Vessels	14
Commercial Vessels - Shrimp Boats	14
Natural Processes	14
General	14
Littoral Drift	15
Winds	15
Hurricanes	19
Improvements Desired	19
Future Without Project Conditions	19
General	19
Bay County	19
Mexico Beach	21
Plan Formulation	22
General	22
Planning Constraints	22
Planning Objectives	23
Plan Formulation	23
General	23
Basic Planning Criteria	24
Technical Criteria	25
Socioeconomic and Environmental Criteria	25
Evaluation Criteria	25
Formulation Methodology	26

MEXICO BEACH, FLORIDA  
Table of Contents (Cont'd)

<u>Item</u>	<u>Page</u>
Management Measures	26
General	26
Without Project Condition (No Action)	26
Other Measures	27
Cost Evaluation Criteria	27
Benefit Evaluation	27
Preliminary Solutions	28
Channel Design Considerations	28
Description of Disposal Plans	28
Preliminary Channel Improvement Plans	31
Comparison of Channel Depths	32
Alternative Plan 1A	32
Alternative Plan 1B	33
Alternative Plan 1C	33
Alternative Plan 2A	34
Alternative Plan 2B	35
Comparison of Preliminary Plans	35
Final Alternatives Considered	36
Alternative Plan 3	36
Alternative Plan 4	36
Seasonality of Benefits and Costs	36
Findings and Recommendations	37

MEXICO BEACH, FLORIDA  
TABLE OF CONTENTS (CONT'D)

LIST OF TABLES

<u>NO.</u>	<u>TITLE</u>	<u>PAGE</u>
1	Channel Depth Availability Under Existing Conditions	6
2	Demographic Characteristics for Bay County and the State of Florida, 1990	8
3	Total Personal and Per Capita Incomes in 1984	9
4	Distribution of Non-Agricultural Income by Major Industrial Class in 1984	9
5	Characteristics of Vessels Permanently Docked in the Mexico Beach Project Area	13
6	Mexico Beach Sediment Transport, Monthly Averages	17
7	Benefits and Costs (\$) of Alternative Plan 1A for a Range of Inlet Depths	32
8	Summary Economic Data for Preliminary Plans	35
9	Economic Summary of Final Alternatives	37

LIST OF FIGURES

<u>NO.</u>	<u>TITLE</u>	<u>PAGE</u>
1	Locality Map	3
2	Study Area Map	7
3	Locations of the 6 Sediment Transport Stations for Mexico Beach, Florida	16
4	Wind Rose	18
5	Projected Income, Employment, and Population, Bay County, Florida	20
6	Alternative Disposal Areas	29

LIST OF PLATES

<u>NO.</u>	<u>TITLE</u>	<u>PAGE</u>
1	Unstabilized Channel Plan	39
2	Unstabilized Channel Plan with Impoundment Areas	40
3	Jet Pump Bypass System	41
4	Stabilized Channel Plan with Two Jetties and Deposition Basin	42
5	Stabilized Channel Plan with Single Jetty and Deposition Basin	43

LIST OF APPENDICES

A	Wave Climate and Sediment Transport Study
B	Geotechnical Investigation
C	Economic Analysis
D	Channel Design and Cost Estimate
E	Environmental Correspondence

# MEXICO BEACH, FLORIDA

## NAVIGATION IMPROVEMENT FOR MEXICO BEACH INLET

### INTRODUCTION

#### AUTHORITY

This study was authorized by Section 102 of the 1966 River and Harbor Act (Public Law 89-789), approved 7 November 1966 which reads in part:

"That the Secretary of the Army, acting through the Chief of Engineers, is authorized and directed to conduct a preliminary hearing and survey to determine the justification for a federally maintained small boat channel with appropriate jetties and turning basins where required at Mexico Beach, Florida."

In addition, a resolution adopted 23 June 1971 by the Committee on Public Works of the United States House of Representatives requested the Board of Engineers for Rivers and Harbors to:

"Review the reports of the Chief of Engineers on St. Joseph Bay, Florida, printed in House Document numbered 595, 81st Congress, 2nd Session, and other pertinent reports, with a view to determining the advisability of modifying the existing project at this time, with particular reference to determining the economic feasibility of a small-boat navigation channel and jetties at Mexico Beach, Florida."

#### STUDY PURPOSE AND SCOPE

The purpose of this study was to investigate the feasibility of the Federal government adopting, improving, and maintaining an existing navigation channel at Mexico Beach Inlet. The study was conducted in accordance with the Principles and Guidelines for Water Resources and other authorities which define the goals and procedures for water resources planning. The depth and detail of these investigations were consistent with the guidance and policies prescribed by the US Army Corps of Engineers Planning Guidance Notebook. The navigation problems of the study area were investigated and alternative plans which would address these problems were formulated. These possible improvements were

evaluated to determine their feasibility in terms of economic, social, and environmental considerations and the extent of the Federal interest. The principal study area (shown in Figure 1) was limited to the City of Mexico Beach, adjacent lands in Bay County, and contiguous waters of the Gulf of Mexico.

## PRIOR STUDIES AND ACTIVITIES

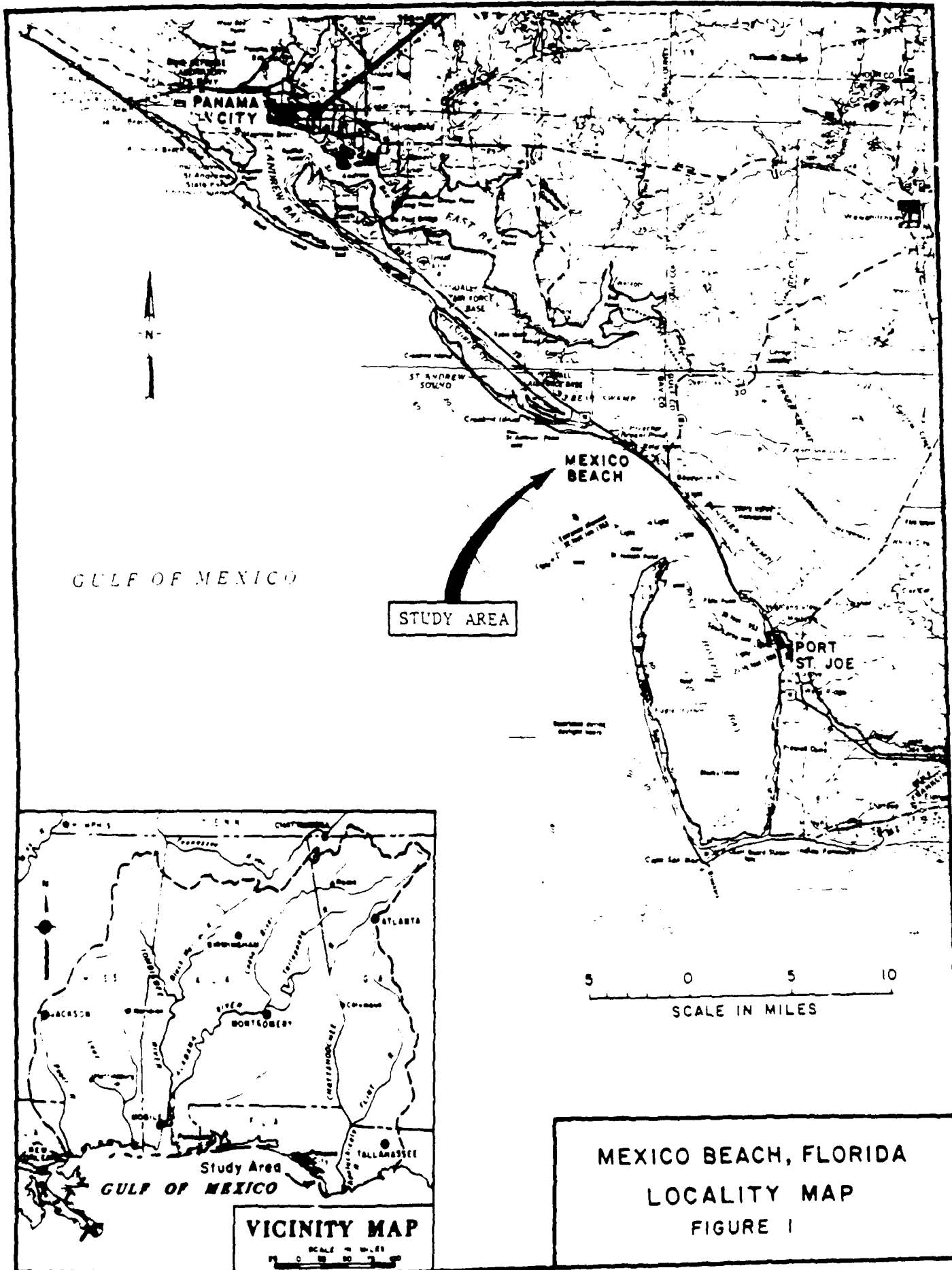
The first feasibility studies for the channel at Mexico Beach were those in response to the authorities cited earlier for this study and report. Studies conducted in 1972-1973, 1975, and 1977 indicated that the desired improvements were not then justified and further investigations were deferred each time. The studies resulting in this report were resumed in 1982.

The U.S. Army Waterways Experiment Station (WES) has tested hydraulic sand bypassing systems at a number of inlets in Florida. A truck based installation using a Pekor jet pump was tested at Mexico Beach Inlet during 1973-1974. WES estimated that this system was capable of transferring 45,000 cubic yards (cy) of sand annually. The City of Mexico Beach later built a pump house and installed 2 Pekor pumps at the inlet. One was placed in the gulf just off the entrance and the other had a swing and harness for movement along the channel between the jetties. Hurricane Eloise damaged the system in 1975 but the city continued operation. However, because of continuous equipment problems and limited funds, however, the system was finally abandoned.

A report was prepared in 1985 under authority of Section 3 of the 1945 River and Harbor Act in response to a local request for Federal assistance in emergency removal of shoals and debris from the inlet channel resulting from Hurricane Elena. This hurricane struck the Florida Panhandle on 30 and 31 August 1985. After the city had restored the channel to pre-hurricane conditions, Hurricane/Tropical Storm Juan again shoaled the channel severely on 31 October 1985. Using a county dragline, the city had almost completed clearing sand and debris from the channel when, on 21 November 1985, Hurricane Kate made landfall at Mexico Beach, and again filled in the channel. The Section 3 report recommended no Federal action since timely maintenance of the channel after storms could best be performed through local initiative.

## STUDY PARTICIPANTS AND COORDINATION

The Corps of Engineers was responsible for the conduct and coordination of this study, consolidation of information from other agencies, formulation of alternative plans and preparation of the report. At the District Level, a multidisciplinary team was used to conduct the study and assemble the report.



Coordination with other agencies began in 1982. The agencies with which planning was most closely coordinated included:

Federal Agencies

U. S. Fish and Wildlife Service  
U. S. Environmental Protection Agency  
National Marine Fisheries Service  
United States Coast Guard

State Agencies

Florida Department of Environmental Regulation  
Florida Department of Natural Resources.

Local Agencies

Bay County  
City of Mexico Beach.

## THE STUDY PROCESS

The planning and study process was consistent with the Water Resources Council's Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies (the "Principles and Guidelines"), published in March 1983, and with the US Army Corps of Engineers Planning Guidance Notebook. Environmental impacts were evaluated in accord with Engineer Regulation (ER) 1105-2-50, Planning Environmental Resources, and ER-200-2-2, Environmental Quality Policy and Procedures for Implementing NEPA (National Environmental Protection Act). The study was performed in sufficient detail to determine what resource management measures would be in the overall public interest at Mexico Beach and should be recommended for Congressional authorization.

## PROBLEM IDENTIFICATION

### RESOURCE MANAGEMENT PROBLEMS

Problem identification was the first task. This was done to determine what improvements were desired; what specific management problems should be addressed; what geographic area would be affected and should be included in the study; what the existing conditions are; and what future conditions may be if no Federal action is taken.

Mexico Beach Inlet, with rapid shoaling within the littoral zone and an unstable offshore bar, presents a hazard to navigation that results in unsafe and costly conditions. For about 20 years local interests have, through elected representatives, expressed

a desire for Federal channel improvements. In addition to the need for navigation improvements, concerns have been expressed over beach erosion problems. However, in accord with the study authority, the study, and this report, focussed on the needs of navigation.

Under current Corps of Engineers guidelines, the plan recommended for implementation must be must be the alternative with the greatest economic benefits consistent with protecting the Nation's environment.

### EXISTING CONDITIONS

The following section describes the present socioeconomic and natural resources of the study area. This profile, along with a projection of future conditions, describes the "Without Project Alternative" and serves as the basis for comparison of formulated plans. A general understanding of the resources and development trends of the study area is helpful in identifying problems and needs and formulating alternative solutions.

### STUDY AREA

Mexico Beach is a retirement, tourist-oriented, community located on the Gulf coast in eastern Bay County, Florida. It is about 21 miles southeast of Panama City and 12 miles northwest of Port St. Joe. The city has developed along U.S. Highway 98, which parallels the beach. Single family houses, primarily for summer use, are densely located between the highway and the primary dune system. Inland of U.S. Highway 98, housing density varies from dense to sparse. The immediate area under study, 4 miles of shoreline and adjacent lands, involves about 6 square miles, all within Bay County, of which approximately 1.4 square miles are within the corporate limits of the City of Mexico Beach. The general geology in the vicinity of Mexico Beach is coastal lowlands which has forested rolling hills in the interior and fine sand beaches along the coast.

Bay County, Florida, has 758 square miles of land area and 271 miles of shoreline, of which 217 miles can be considered beach. Of that amount, about 45 miles are on the Gulf of Mexico. Of that 45 miles, about 17 are under Federal or State ownership with the remaining 28 miles privately owned. Two miles of shoreline are in public parks and are open for public recreation, about 17 miles are privately owned but more or less open to the public for recreation, and the remaining 26 miles are undeveloped.

Mexico Beach prides itself on being called the "Eastern Gateway to the Miracle Strip", that section of northwest Florida which

has some of the most attractive beaches in the state and many opportunities for recreation and leisure time entertainment. The heavily wooded inland portion of the county offers good hunting. With its unique combination of physical features, white-sand beaches, and mild climate, Bay County provides many forms of outdoor recreational opportunities, including swimming, boating, fishing, and sunbathing.

#### EXISTING NAVIGATION CHANNEL

Mexico Beach Inlet is located on the western edge of the city. It provides gulf access to a channel maintained by the city that extends inland north of Highway 98 and winds through residential neighborhoods, as shown on Figure 2. The city tries to maintain the channel to average dimensions approximating 5 feet deep by 40 feet wide at an average annual cost of about \$50,000. Because of rapid shoaling in the entrance channel, clear access to the gulf can be maintained less than half of the time. This is shown in Table 1 which shows the conditions existing under non-Federal maintenance of the channel.

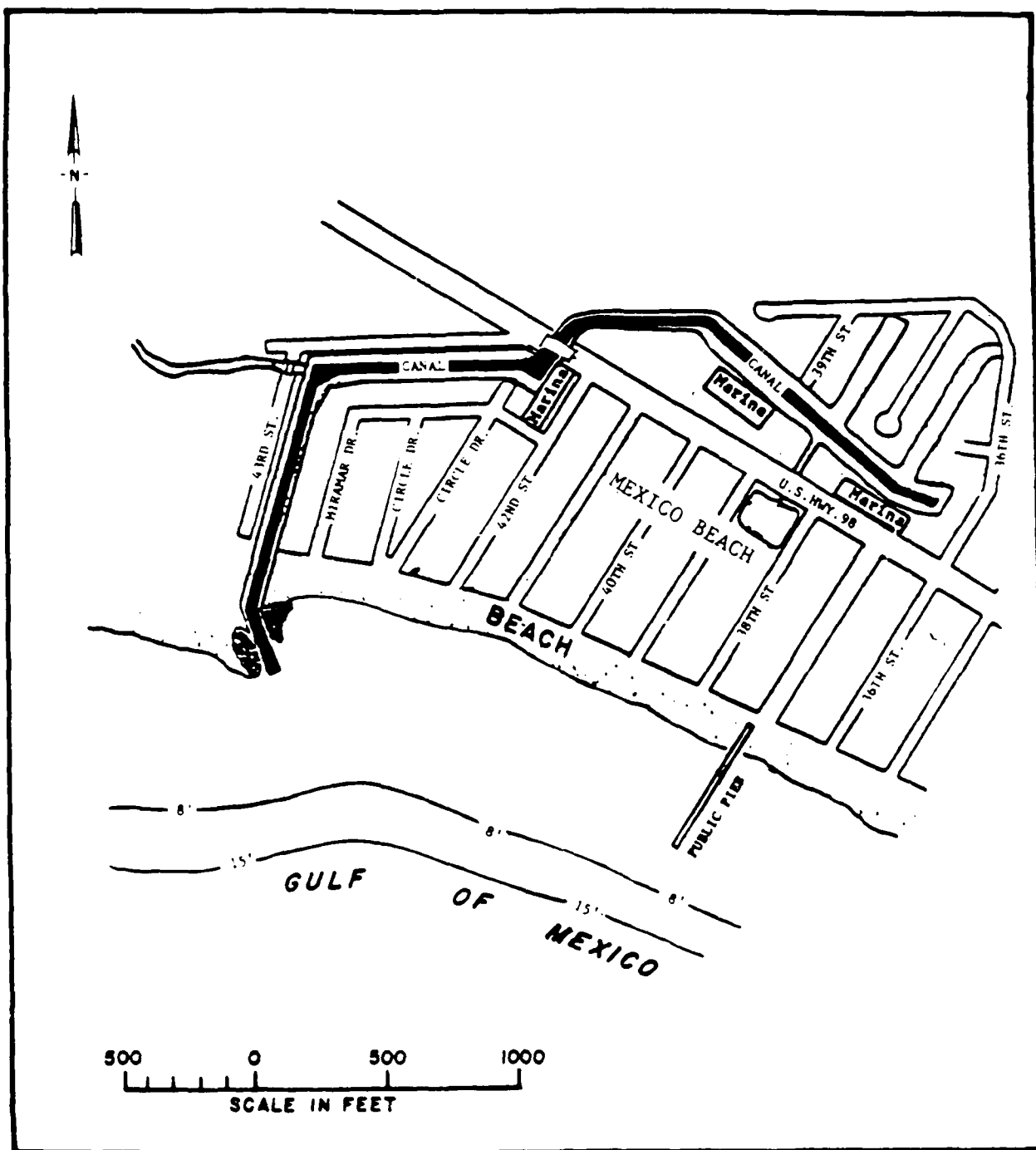
TABLE 1

#### Channel Depth Availability Under Existing Conditions

	<u>Channel Depth in Feet below MLW</u>			
	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
Percent Time Available	60%	30%	10%	0%

Three public marinas provide facilities at Mexico Beach for commercial and recreational boat use. These marinas harbor a large fleet of recreational, charter, and commercial fishing boats. One of the marinas is full service in that it provides food, fuel, and supplies to the boat users. That marina also provides loading and unloading facilities for commercial shrimp boats. There are 245 wet and dry slips available for vessels at the three marinas, of which 198 are occupied. There is also a public launching ramp for small craft. In addition to the resident fleet, an average of 200 trailer-drawn boats per week use the inlet channel, mostly on weekends throughout the summer tourist season. Plate 1 illustrates the facilities available at the largest marina, which is located about 3,000 feet from the inlet mouth.

There are no Federal projects at Mexico Beach. There are, however, existing Federal projects at Panama City Harbor, about 20 miles west of Mexico Beach, and at Port St. Joe Harbor, about



MEXICO BEACH, FLORIDA  
STUDY AREA MAP

FIGURE 2

12.5 miles east of Mexico Beach, which provide for both deep and shallow draft navigation.

#### ECONOMY AND DEVELOPMENT

The Panama City Standard Metropolitan Statistical Area (SMSA) consists of Bay County. According to the Florida Statistical Abstract, the 1980 estimated population of Bay County was 98,000, a 23 percent increase over the 1970 population. The 1980 estimated population density of Bay County was 131 persons per square mile. About three quarters of the county population is within Panama City and the surrounding suburbs. Pertinent demographic data for Bay County, and the State of Florida, are summarized in Table 2.

TABLE 2

Demographic Characteristics for Bay County  
and the State of Florida, 1990

	<u>BAY COUNTY</u>	<u>STATE</u>
Estimated population	129,300	12,112,300
Percent increase '80 - '90	32.0	24.9
Density (per sq mi)	171	224

Source: Florida Statistical Abstract, 1986, College of Business Administration, University of Florida.

The permanent population of Mexico Beach is about 1500. During the summer season tourist visitation averages about 700 daily. The Mexico Beach fishing rodeo, held annually during April, May, and June, attracts hundreds of fishing and pleasure craft to the area. Tourists are drawn from as far north as Canada, but more commonly come from North Carolina, Virginia, Tennessee, Mississippi, Georgia, and Alabama as well as the surrounding areas. Tourists contribute significantly to the Mexico Beach economy.

Total personal and per capita incomes in 1979 for Panama City SMSA and the State of Florida are presented in Table 3. Personal income for nonagricultural business and industry in the Panama City SMSA totaled \$291.6 million in 1979. Manufacturing, services, and retail trade comprised the principal industrial sectors. The high levels of income earned from services and retail trade reflect the large number of retired persons residing in Florida and the degree of tourism. Table 4 presents an income summary for Panama City SMSA and the State of Florida.

TABLE 3

Total Personal and Per Capita Incomes in 1984

<u>AREAS</u>	<u>TOTAL PERSONAL INCOME</u> <u>(Millions of Dollars)</u>	<u>PER CAPITA</u> <u>INCOME (\$)</u>
Bay County (Panama City SMSA)	\$ 1,136.4	\$10,473
State of Florida	\$140,196.7	\$12,773

TABLE 4

Distribution of Non-Agricultural Income  
by Major Industrial Class in 1984  
(Rounded to Thousands of Dollars)

<u>INDUSTRY</u>	<u>PANAMA CITY SMSA</u>		<u>STATE OF FLORIDA</u>	
	<u>PERSONAL INCOME</u>	<u>PERCENT</u>	<u>PERSONAL INCOME</u>	<u>PERCENT</u>
Manufacturing	\$ 87,511	16.7	\$11,447,202	16.2
Construction	\$ 63,175	11.9	\$ 6,811,580	9.6
Wholesale Trade	\$ 27,869	5.3	\$ 5,799,723	8.2
Retail Trade	\$116,067	22.2	\$10,878,618	15.4
Finance, Insurance & F.E.	\$ 34,896	6.7	\$ 6,289,539	8.9
Transport/Communication/ Public Utilities	\$ 50,219	9.6	\$ 7,141,236	10.1
Other Services	\$135,334	25.9	\$22,007,714	31.1
	-----	-----	-----	-----
TOTAL	\$523,534	100.0	\$70,660,105	100.0

Source (Tables 2&3): Florida Statistical Abstract, 1986. College of Business Administration, University of Florida.

Bay County is served by numerous state and county roads. U.S. Highway 98 is the main east-west route and State Highway 77 is the main north-south route. Panama City Municipal Airport serves Bay County with regularly scheduled commercial airlines and private air services. Commercial bus transportation is available to most of the smaller cities and towns in the county.

## CLIMATE AND WEATHER

The semitropical climate of the area, one of its major assets, is influenced considerably by the proximity of the Gulf of Mexico. Water temperatures along the shore range from an average of 63

degrees Fahrenheit (F) in December and February to 85 F in August. Southerly winds in the summer produce frequent afternoon thundershowers, while winter storms usually result from frontal passages in which rain generally lasts the duration of the storm. The area is subject to tropical hurricanes, particularly in late summer and early fall. Spring and late fall are mild with moderate temperatures and abundant sunshine, broken occasionally by rain showers.

The mean monthly rainfall for the Mexico Beach area is heaviest from June through September, the season for convection type rainfall, with September being the wettest month. The mean summer rainfall provides 21 inches of the average annual total of 58 inches. The other three seasons of the year receive a mean rainfall of about 12 inches each. Tropical storms occasionally yield enough rainfall to cause widespread inland flooding. Rainfall of 5 to 7 inches in 24 hours is not uncommon to the area and occasionally it has reached 10 inches in 24 hours.

Ambient air temperatures seldom exceed 100 F, but it is very common for the mean daily temperature to average around 80 F during the summer months with the highest mean daily temperature occurring in July. Mean daily temperature varies from a low of 54.3 F in January to a high of 81.9 F in July. Periods of cold weather generally do not last more than a few days, and the temperature rarely falls below freezing for more than a day.

#### COASTAL CONDITIONS

The shores of Mexico Beach, a major asset, are relatively straight with white sandy beaches. Within the city limits, the primary dune system is low and the dune line is occupied by houses. The projection of Cape San Blas and St. Joseph Spit to the southeast of Mexico Beach protects this strip of coast from southeasterly winds, and a well developed dune system has not formed. A well developed primary and secondary dune system begins immediately west of Mexico Beach with elevations ranging from 10 to 12 feet above National Geodetic Vertical Datum (NGVD).

The navigation channel at Mexico Beach Inlet was constructed about 30 years ago by local interests. It provides access to the Gulf of Mexico for a long artificial channel, or canal, that winds several miles inland. Part of the channel near the inlet was once a tidal stream that discharged intermittently into the gulf. Bank to bank top widths of the channel vary from about 80 feet near the inlet to about 50 feet in the upper reaches. Top of bank elevation averages about 10 feet above mean low water. The channel receives fresh water inflow from pine woods west and north of the city but no significant streams enter the canal north of the highway. Salt Creek, a small stream which drains Bear Swamp, enters the channel about 1,000 feet inland of its

mouth. The flow from Salt Creek is stained with tannin. As a result of these dissolved organic substances, the water in the channel usually has the color of coffee. On a falling tide, the gulf waters at the mouth of the channel are also stained for a short distance.

Invertebrate populations on the beach and in the littoral zone are moderate to high for a gulf beach. Organic nutrients from Salt Creek, and probably to some extent from the Apalachicola River, influence productivity. Ghost crabs are abundant on the beach, while hermit crabs and mole crabs are abundant in the littoral zone. Inside the inlet, fiddler crabs are abundant on the banks of the channel and Salt Creek.

Most of the finfishes in the study area are pelagic species, although sea trout winter inside the inlet. Transient schools of Spanish mackerel, cobia, bluefish, ladyfish, and several species of jack move inshore close enough to the beach in sufficient abundance to support an active surfcasting fishery. Commercial beach seiners also fish for some of these species as well as mullet, round scad, Spanish sardines, and ballyhoo, which are sold for bait. Small numbers of pompano are also taken. Beach fishing becomes active in April when schools of cobia and mackerel show up as westward migrating schools, and continues into the fall.

The main marine mammal found in the area inshore of the 5 fathoms contour is the Atlantic bottlenose dolphin. According to A Summary of Knowledge of the Eastern Gulf of Mexico, 1973, thirteen other species of whales and dolphins have been reported offshore in this part of the Gulf of Mexico but do not come into the shoal waters of the project area under normal circumstances.

Coastal birds that tolerate urban development are common in the area. Egrets and herons of several species feed in the inlet channel. The brown pelican is the only endangered bird listed by the Department of the Interior which is frequently found in the area. However, the bald eagle and the peregrine falcon are occasional visitors. A resource inventory provided by the Fish and Wildlife Service is contained in Appendix E following this report.

#### PROBLEMS AND NEEDS

The problems and needs addressed in this study are related to natural processes affecting the coastal area. These are discussed in subsequent pages along with navigation problems and improvements desired, as expressed by local interests.

## NAVIGATION PROBLEMS

The primary problem at Mexico Beach is severe shoaling in the mouth of Mexico Beach Inlet resulting from littoral drift. The predominant littoral drift in that vicinity is from west to east as the result of wave refraction over the shoals off St. Joseph Peninsula. Data indicates that there are no significant drift reversals. Local interests constructed concrete rubble jetties at the mouth of the channel which reduced shoaling for several years after their construction. These obstructions to the littoral drift caused shoreline changes, as indicated by available coastal charts and aerial photographs; west of the inlet the shoreline advanced while on the east side it retreated, clear indication of a predominate eastward drift. Hydrographic surveys taken in 1974, 1982, 1984, and 1985 indicate controlling depths at the inlet mouth and offshore bar of 3 to 4 feet.

Shoaling in the channel prevents many recreational and commercial boats from getting in and out of the channel. This results in lost recreational opportunities, lost fishing time, reduced revenues to charter craft, and reduced catches. Many boats have been damaged in an attempt to navigate the channel with marginal water depths. Local interests fear that the overall use of the channel and service facilities has declined because of the unreliable channel depths. This decline is believed to have adversely impacted the general economy of the area, since it depends heavily on tourism, services, and water-based recreational activities.

## VESSEL CHARACTERISTICS AND OPERATIONS

Field surveys conducted in October 1985, and updated in March 1986, identified two distinct types of users for this channel, recreation vessels and commercial vessels. In addition to the locally docked craft, transient vessels also use the channel. Because, however, there is no detailed data available, an analysis of the economic benefits associated with transient vessels using this channel was not conducted and has not been included in this report. Table 5 summarizes the characteristics of vessels located in the project area which use the existing channel.

Recreation Vessels. Power boating is enjoyed almost year round in the project area. The boating season lasts about eight months, from March through October, with peak boating activity during late spring and summer. Typically, power boaters operate their vessels one time per week during the months of March, April, September and October and twice a week during the months of May through August for a total of 48 average annual trips. The average duration of each boating trip is three hours. A typical boating group size, per trip, is two adults and two

children.

Field information indicates power boaters will select various options when confronted with inadequate depths in Mexico Beach Channel. The options available are: (1) Losing boating opportunities; (2) using the nearest comparable channel; and (3) continuing to navigate the Mexico Beach Channel. The vessels docked in the marinas are not readily transportable, therefore

TABLE 5

Characteristics of Vessels Permanently Docked in the  
Mexico Beach Project Area

Type of Vessels	Vessel Physical Location	Number of Vessels	Vessel Length (Feet)	Average Loaded Draft (Ft.)	Required Channel Depth (Feet)	Inlet Canal 1/
<u>Recreation:</u>						
Power Boats	Marina #1	48	24 - 30	2.5	3.5	3.0
Power Boats	Marina #2	101	24 - 30	2.5	3.5	3.0
Power Boats	Marina #3	30	24 - 30	2.5	3.5	3.0
Power Boats	Private	<u>200</u>	24 - 30	2.5	3.5	3.0
	SUB-TOTAL	379				
<u>Commercial:</u>						
Ch Cruisers	Marina #2	6	Up to 24	3.0	4.5	3.5
Ch Fishing	Marina #2	10	Up to 42	4.0	5.5	4.5
Shrimp Boats	Marina #2	<u>3</u>	Up to 65	4.5	6.0	5.0
	SUB-TOTAL	19				
TOTAL ALL VESSELS		398				

SOURCE: Local Public Marina Owners or Operators and Channel Users.

1/ Information provided by local boat users indicates that a safety clearance of 1/2 to 1 foot between the vessel's keel and channel bottom to assure safe boating operations is typical.

users cannot readily relocate them to an another channel when channel depths are inadequate at Mexico Beach. These users are experiencing lost boating opportunities. All the vessels docked at private residences are readily transported by boat trailer and the owners have indicated that they will use facilities at Port St. Joe when there are inadequate channel depths at Mexico Beach. The round trip highway distance between Port St. Joe and Mexico Beach is 25 miles. Some users will continue to navigate Mexico Beach channel, but they do so without adequate knowledge of prevailing channel depths. There is, therefore, a risk of vessel

damages resulting from making the trip.

Charter Cruisers and Charter Fishing Vessels. The majority of the charter vessels here are family-owned and operated and most have operated out of Mexico Beach for years. The season for the charter boat fleet lasts about eight months, from March through October, with peak boating activity during late spring and summer. Typically, charter fishing boat owners use their vessels once per week during the months of March, April, and October and three times a week during the months of May through September. Charter fishing vessels are used to carry individuals, (12 per trip), for deep water Gulf fishing. Charter cruiser boat owners use their vessels during the same time period as charter fishing boats. Charter cruisers are used to carry private parties (maximum of 6 patrons) for coastline cruises combined with an evening meal. Overnight accommodations are also available on charter cruisers. Field surveys indicate there is a viable charter market at Mexico Beach and that charter boat owners will remain in Mexico Beach even though there are times when channel depths are known to be inadequate. Boat owners explained that their reason for staying in Mexico Beach is the ever-increasing competition for the charter boat service in that area. They believe that by keeping their businesses based at Mexico Beach, rather than relocating, that they will at least maintain their existing share of the charter market. Also, by relocating elsewhere, they would have to compete with an established charter fleet and, possibly, bear increased operating expenses.

Commercial Vessels - Shrimp Boats. Shrimp boat operators, when confronted with inadequate channel depths in the project channel, elect to use another channel rather than lose fishing opportunities. These users are able to load and unload at various full service marinas near the channel in the Panama City area, the nearest location of such marinas. There are no significant variations in boat operating expenses when they operate out of Panama City since the distance to suitable commercial shrimping grounds is approximately the same as the distance out of Mexico Beach. The primary additional costs incurred by the users are auto commuting costs when channel depths at Mexico Beach are inadequate. The operators dock their boats in Panama City and they and their crew commute a round trip distance of 40 miles between the boats and their residences at Mexico Beach in private automobiles.

## NATURAL PROCESSES

General. The coastline at Mexico Beach is oriented from northwest to southeast. In the southeast quadrant, St. Joseph peninsula protects Mexico Beach by limiting the fetch length. Similarly, the barrier spit forming the east end of East Bay limits the fetch length in the northwest quadrant. The study area is most

susceptible to waves moving in from the south to north-northwest quadrant.

Littoral Drift. There was a large and significant change in the information available about the volume of littoral drift for the study area late in the study process. This resulted from calculations made by the US Army Corps of Engineers Coastal Engineering Research Center (CERC) at the US Army Engineer Waterways Experiment Station. They were requested to estimate the drift volume using information being developed by the Gulf of Mexico phase of the Wave Information Study (WIS) which was then in progress (discussed in greater detail below). Results of the early phases of the study using the lesser drift volume were recalculated.

The area seaward of Mexico Beach is a complicated bathymetric region. The wave climate and sediment transport rate at the inlet were determined by the CERC staff and their report is reproduced in Appendix A. That office first used 13 years (1956-1968) of hindcast data newly developed for the Gulf Coast WIS. A transformation technique (WIS Report 8, Jensen 1983) was employed to generate wave information at the 30-foot water depth contour from intermediate water depths. Using that information, another technique described in WIS Report 9, (Jensen, 1983) was employed to determine the shallow water refraction and shoaling effects. That process involved the use of the computer algorithm RCPWAVE (Technical Report CERC-86-4, Report 1, "RCPWAVE - A Linear Wave Propagation Model for Engineer Use"); an algorithm for estimated surf zone wave parameters (Miscellaneous Paper CERC-85-13); and equations 4-44 and 4-50b from the Shore Protection Manual (CERC 1984) for estimating longshore sediment transport.

The analysis indicated that there was a large volume of drift moving to the east and essentially none moving to the west. CERC's analyses were conducted for six different locations near the inlet, as shown in Figure 3. Results of the sediment transport analyses for Station 3, the one closest to the mouth of the inlet, are presented in Table 6. Averaging the quantities over the 13 years analyzed yielded an annual average for littoral drift of about 181,000 cy, all moving in an easterly direction, with almost none moving to west. This entire amount would have to be dredged each year to maintain the channel depth.

Winds. Winds are predominantly from the southwest during March through August and are of sufficient duration and velocities to generate waves affecting channel shoaling. Wind statistics observed at Tyndall Air Force Base near Panama City are illustrated in the wind rose shown in Figure 4. During CERC's analyses, a further investigation of the offshore-hindcast data was performed to determine the intensity and directional

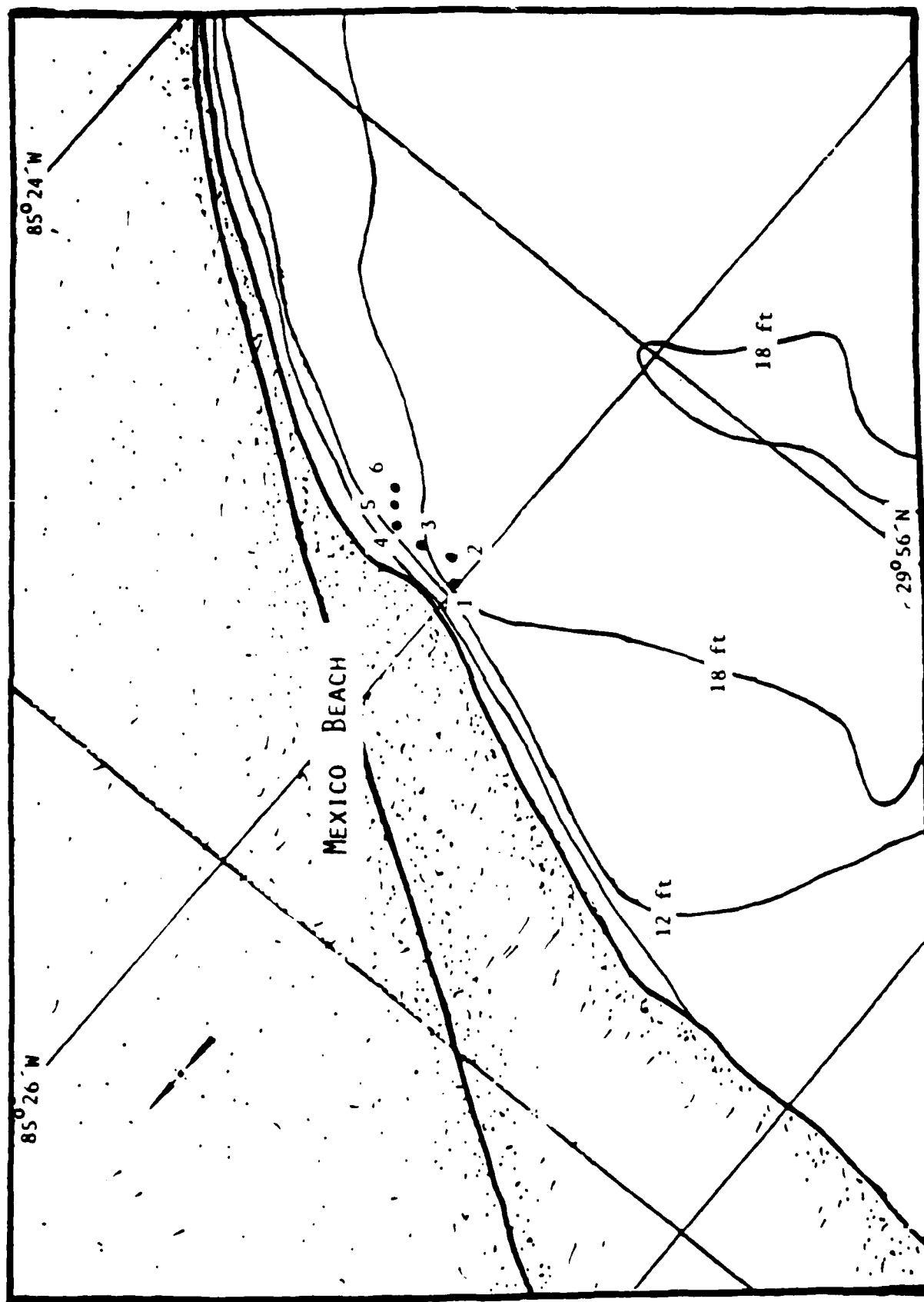


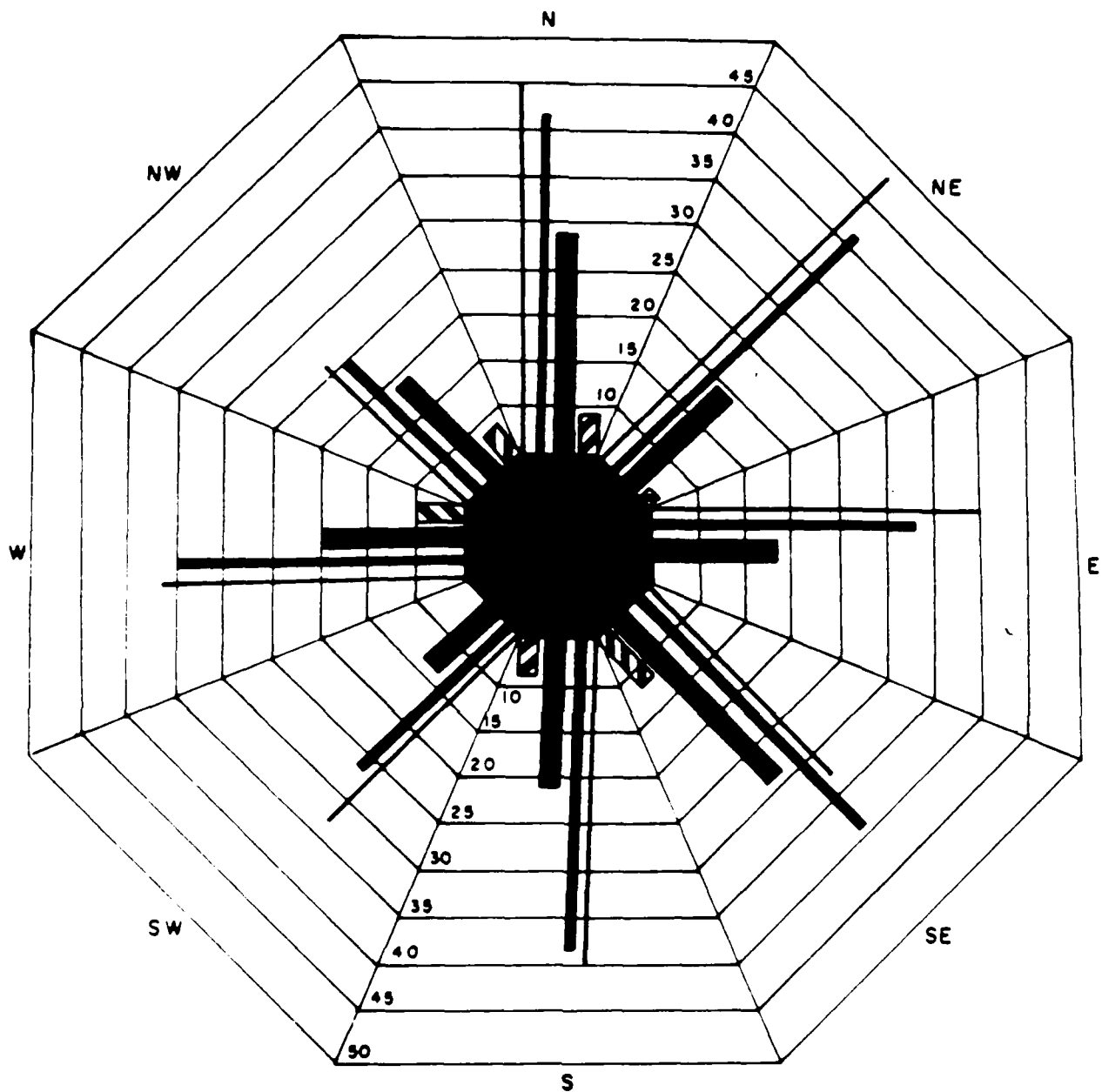
Figure 3. Locations of the 6 sediment transport stations for Mexico Beach, Florida.

TABLE 6  
MEXICO BEACH SEDIMENT TRANSPORT  
MONTHLY AVERAGES  
Volume in Cubic Yards

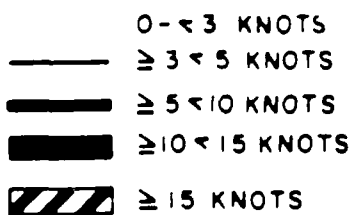
STATION 3

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
1956	30000	19000	13000	35000	800	5300	24000	18000	11000	8800	6400	62000	233300
1957	23000	24000	29000	8500	16000	14000	13000	22000	17000	2700	6900	6600	182700
1958	43000	100000	21000	10000	2200	28000	3800	15000	1000	210	3200	28000	255410
1959	7300	31000	16000	9700	3700	7500	7200	22000	19000	12000	3000	8900	147300
1960	12000	57000	12000	4900	3200	3000	10000	9500	5400	4200	260	2300	123760
1961	18000	16000	4500	18000	2100	1900	450	11000	130000	97	4100	7800	213947
1962	23000	15000	9200	6100	1100	2300	10000	6000	3000	14000	15000	6900	111600
1963	12000	12000	11000	21000	4300	18000	16000	6500	3600	350	6700	5200	116650
1964	8400	75000	17000	3400	3200	550	34000	15000	1400	35000	7200	14000	214150
1965	77000	10000	9200	7500	280	3100	9200	29000	15000	13000	30000	940	204220
1966	4200	18000	7000	21000	17000	2700	7300	28000	15000	8200	10000	3200	141600
1967	3700	5800	11000	10000	43000	9500	18000	13000	1300	2500	110000	37000	264800
1968	8400	15000	18000	14000	17000	15000	14000	4500	3600	1500	16000	19000	146000
AVG.	20769	30600	13685	13008	8760	8527	12842	15346	17408	7889	16828	15526	181187

AVERAGE ANNUAL MAXIMUM DURATION (IN HOURS), WIND SPEED  
AND DIRECTION = 1/49 THRU 12/70, TYNDALL AFB DATA



SPEED SCALE



MEXICO BEACH, FLORIDA  
WIND ROSE

FIGURE 4

distribution of the winds derived in St. Joseph Bay during the calm periods. The wave estimates derived from hindcast wind speeds and directions in the bay were found to have no significant effect on the sediment transport potential at Mexico Beach.

Hurricanes. The Wave Information Study (WIS) hindcast for the Gulf of Mexico which was used by CERC in performing the sediment transport analyses did not include hurricane generated waves. However, during extreme weather conditions, such as tropical cyclones, the channel would shoal quickly. Hurricanes and tropical storms originate in tropical or subtropical latitudes north of the equator during the summer and fall months, but most frequently in September. These storms move erratically into the gulf or into the North Atlantic and are accompanied by high winds, tides, and heavy rainfall. Extreme wind conditions occur as follows:

Mean Recurrence Interval (years)	5	10	25	50	100
Maximum Sustained Wind (mph)	73	84	101	117	136

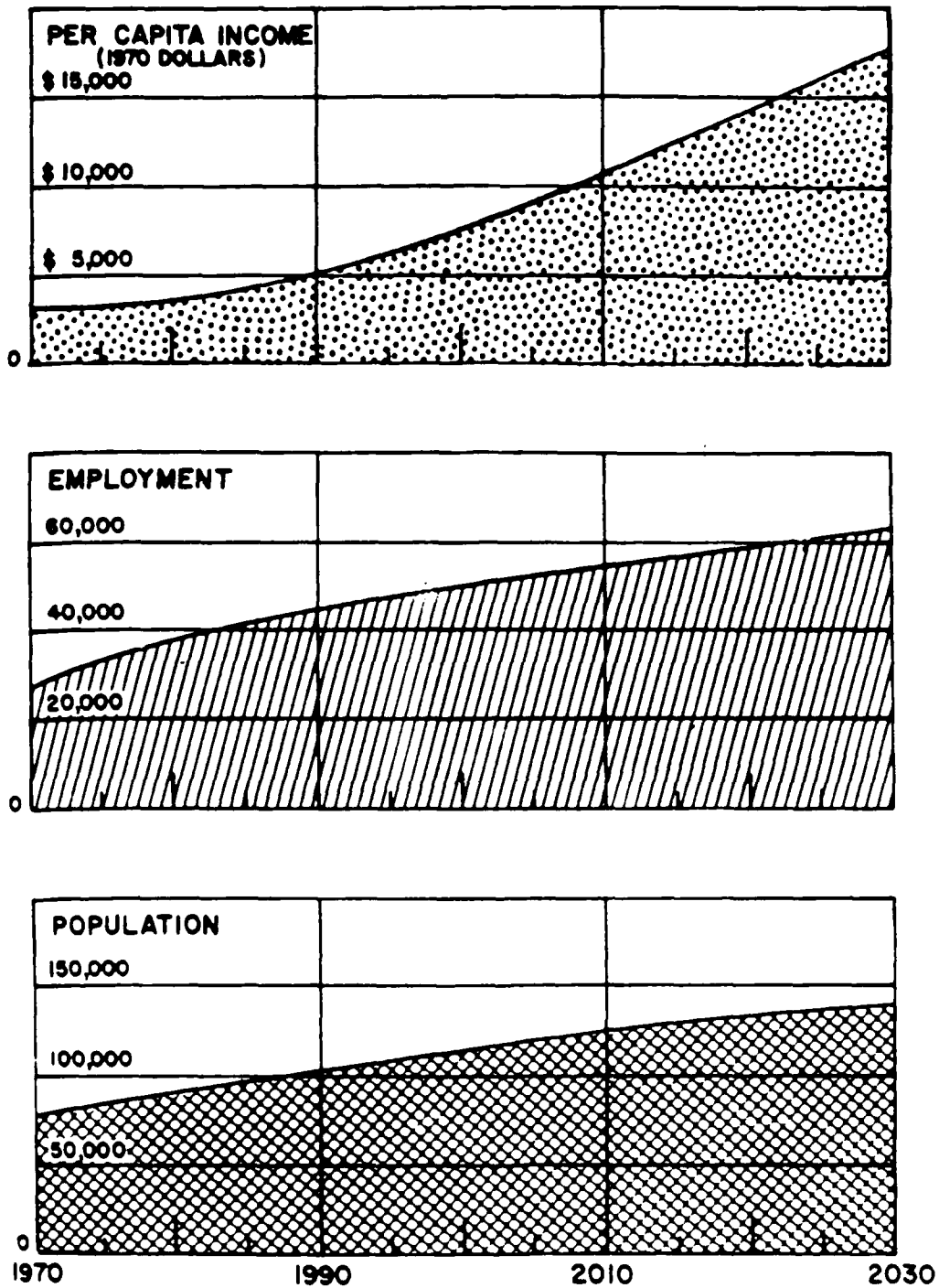
#### IMPROVEMENTS DESIRED

Local interests desire a safe, dependable, accessible navigation channel for year around use. The principal improvements desired are the deepening of the existing channel, the rehabilitation of the existing jetties, provision of a sand bypassing system to renourish the downdrift beach, and sufficient maintenance to insure adequate channel dimensions most of the time.

#### FUTURE WITHOUT PROJECT CONDITIONS

General. This section describes the future without project condition which could be reasonably expected to occur without Federal assistance to improve the channel at Mexico Beach Inlet. This condition will provide a base for evaluating the effects of proposed plans of improvement. Evaluation requires examination of existing conditions of the study area's most significant resources, then projecting future conditions.

Bay County is following the development trend of the State of Florida. The beach region is undergoing rapid growth in tourist-related facilities. Per capita personal income and median family income has been increasing steadily. The coastal area of the county has recently emerged as one of the prime tourist attractions north of Tampa-St. Petersburg, which indicates a continued increase in both sales, receipts and income. An indication of the projected future growth, employment, and per capita income of Bay County is shown in Figure 5.



Projected Income, Employment, and Population, Bay County, Florida.

FIGURE 5

Mexico Beach. Although the natural resource values of the undeveloped land adjacent to Mexico Beach will change with future development, the natural values of the inlet and adjacent beaches are not expected to diminish in future years. Because of its importance to the local economy, it is expected that at least a marginal access channel to the gulf will continue to be maintained. Recreational boaters and charter operators will continue to use the inlet channel and harbor facilities in greater numbers, as the popularity of the area for recreation continues to increase. Therefore, damages, delays, and lost recreational opportunities associated with existing conditions can be expected to continue. Commercial fishermen will also continue to experience additional expense and lost fishing time from inlet conditions.

Two distinct types of vessel traffic exist at Mexico Beach Inlet, recreation vessels and commercial vessels. In addition to the locally based vessels, transient craft also use the channel, but there is no data available on transients so they were not included in the analysis. In the fleet of locally based vessels there are 379 recreational motor boats, 16 charter vessels, and 3 shrimp boats. The motor boats all range from 24 feet to 30 feet in length and have an average loaded draft of 2.5 feet. There are 6 charter cruisers with lengths up to 24 feet and loaded drafts of 3 feet and 10 charter fishing boats with lengths up to 42 feet and loaded drafts of 4 feet. Finally, the 3 shrimp boats have lengths up to 65 feet and drafts of 4.5 feet.

Most of the charter vessels are family owned and operated and have operated out of Mexico Beach for years. They have an annual season that lasts about 8 months, from March through October, with peak activity during late spring and summer. Field surveys indicate that there is a viable market at Mexico Beach despite the known periods of inadequate depths. Since there is increasing competition in charter service in that area, operators believe that by remaining based at Mexico Beach they at least maintain their existing share of that market.

The shrimp boats are also family owned and operated and have been based at Mexico Beach for years. These vessels have a May through December channel usage season. To avoid loss of shrimping opportunities, these operators elect to use a different channel when depths at Mexico Beach are inadequate. Since the nearest comparable marina is at Panama City, they operate from there. There is no significant difference in operating expenses when operating out of Panama City, but the operators incur the additional expense of using their personal automobiles between Mexico Beach and Panama City, a distance of 40 miles.

The recreational boaters have a seasonal usage of March through

October, the same as the charter vessels. Typically, owners use their boats an average of 48 trips per year, with a crew of two adults and two children

## PLAN FORMULATION

### GENERAL

This section describes the objectives, constraints, methodology, and result of the plan formulation process for the Mexico Beach Inlet channel. Plans were formulated systematically to include elements that contributed to National Economic Development (NED) consistent with protecting or enhancing Environmental Quality (EQ). At Mexico Beach, the specific need was to provide safe and efficient channel for navigation. The plan formulation process tried to satisfy that need to the maximum extent possible in each alternative plan or plan feature developed. A broad range of possible solutions were compared and from these the best plans were selected for further development and evaluation. The final array of alternatives represented the best opportunities available for satisfying the planning objectives.

### PLANNING CONSTRAINTS

The planning effort was conducted within constraints established by Federal law, particularly the National Environmental Policy Act of 1969 (PL 91-190), Section 122 of the River and Harbor Act of 1970 (PL 91-611), Clean Water Act of 1972 (PL 95-217), and Water Resources Council's Principles and Guidelines. In addition, various other Federal and State laws and Executive Orders guided the formulation of plans by setting standards for plan output, establishing limits on the impact the plan may have on certain resources and establishing responsibilities on implementation and funding.

The major constraints placed on the study by the above laws and other legislation included the following requirements:

- o Consider plan impacts on the resource elements listed in Section 122 of the 1970 River and Harbor Act.
- o Conduct tests on sediments to be dredged if polluted, or ever could have been polluted.
- o Avoid adverse impacts to habitat of endangered species.
- o Consider plans consistent with the Florida Coastal Program.

- o Minimize impact on historical and archeological sites.
- o Coordinate closely with the U.S. Fish and Wildlife Service, the Environmental Protection Agency, and the National Marine Fisheries Service.
- o Obtain state water quality certification on actions by the Federal Government involving the discharge of dredged material into "Waters of the United States."
- o Observe the Principles and Guidelines.
- o In addition to the above constraints, consider also that both existing and future vessels using this channel are restricted in size by the 14-foot vertical and 20-foot horizontal clearances of the US Highway 98 bridge which crosses the channel.

#### PLANNING OBJECTIVES

Following problem identification, the second planning task is plan formulation. The specific planning objectives are concise statements of resource needs which are not being met entirely by existing management measures. The objectives listed below apply to the 50-year period of analysis (1990-2039) considered in this study:

- o Reduce operating expenses and lost time for users or potential users of the Mexico Beach channel.
- o Improve navigation safety and reduce the risk of grounding and damages.
- o Improve water-based recreational opportunities.
- o Preserve, protect, or enhance valuable natural or cultural resources in the area.

#### PLAN FORMULATION

General. The Water Resources Council's Principles and Guidelines established the process for selecting the NED plan--the plan that reasonably maximizes net national economic development benefits. The NED plan must also be complete, effective, and acceptable to the affected public. Appropriate mitigation of adverse impacts must be an integral part of the plan. Normally the NED plan is also the recommended plan.

Alternative plans which contribute to the Federal objective should be systematically formulated. In addition to a plan which

reasonably maximizes contributions to NED, other plans may be formulated which reduce net NED benefits in order to further address other Federal, state, local, and international concerns not fully addressed by the NED plan. These additional plans should be formulated in order to allow the decision maker the opportunity to judge whether these beneficial effects outweigh the corresponding NED losses.

In general, in the formulation of alternative plans, an effort is made to include only increments (on separate plan elements) that provide net NED benefits after accounting for appropriate mitigation costs. Include appropriate mitigation of adverse environmental effects as required by law in all alternative plans. Increments that do not provide net NED benefits may be included, except in the NED plan, if they are cost-effective measures for addressing specific concerns.

Basic Planning Criteria. Alternative plans, including the NED plan, should be formulated and evaluated in consideration of four criteria: completeness; effectiveness; efficiency; and acceptability.

1. **Completeness** is the extent to which a given alternative plan provides and accounts for all necessary investments or other actions to ensure the realization of the planned effects. This may require relating the plan to other types of public or private plans if the other plans are crucial to realization of the contributions to the objective.

2. **Effectiveness** is the extent to which an alternative plan alleviates the specified problems and achieves the specified opportunities.

3. **Efficiency** is the extent to which an alternative plan is the most cost effective means of alleviating the specified problems and realizing the specified opportunities, consistent with protecting the Nations's environment.

4. **Acceptability** is the workability and viability of the alternative plan with respect to acceptance by State and local entities and the public and compatibility with existing laws, regulations, and public policies.

ASA(CW) must approve any recommendation for a departure from the NED plan. A recommended plan that is a less expensive or a scaled-down version of the NED plan will probably be approved. However, a recommended plan which is more expensive than the NED plan will probably only be approved if the local sponsor agrees to pay all additional costs and the deviation is justifiable due to incremental project outputs (those not offered by the NED plan, some or all of which may not be reducible to monetary terms, such as reduction in the threat to loss of life).

Technical Criteria. Technical criteria applicable to the study include:

- o Channel improvements should have dimensions adequate for expected user vessels.
- o The harbor should have available facilities or expansion potential to accommodate projected traffic and commerce.
- o Alternative plans should be within the capabilities of available dredge plant to construct and maintain.
- o Plans should require maintenance of berthing areas outside the boundaries of any Federal project.
- o The selected plan should be consistent with local, regional, and state goals for economic development.

Socioeconomic and Environmental Criteria. Criteria for consideration of socioeconomic and environmental factors are established in part from the National Environmental Policy Act of 1969, Section 122 of the River and Harbor Act of 1970, and Section 404(b) of the Clean Water Act of 1977. Plans should be formulated to enhance, where practical, the beneficial effects, and minimize the adverse effects of the project on:

- Water quality
- Air quality
- Aesthetics
- Wetlands
- Physical characteristics
- Long-term changes
- Biological productivity
- Structure of biological communities
- Species diversity
- Patterns of commercial harvest of fish and shellfish.
- Man-made resources
- Availability of public facilities and services
- Business and service activities
- Employment effects and tax and property values
- Community and regional growth.

Evaluation Criteria. Economic criteria were established to insure that the selected plan was the most economical way of meeting the planning objectives. Those applicable to this study are:

- o The plan must have positive net national economic

development benefits.

- o The plan should provide the maximum net benefits possible within the formulation framework, or adequate justification for any deviation.

- o Benefits and costs should be in comparable economic terms based on a 50-year amortization period and the current discount rate as determined by the Water Resources Council. The discount rate of 8-7/8 % used was based on the cost of Federal borrowing during the preceding 12 months. All financial comparisons are in 1988 dollars. Annual charges also include the cost of operation and maintenance and were adjusted to account for the existing local expenditure for maintenance dredging of \$50,000 annually.

#### FORMULATION METHODOLOGY

Plans were formulated through an iterative, three-stage process:

- (1) Possible Solutions;
- (2) Development of Intermediate Plans; and
- (3) Development of Detailed Plans.

The formulation proceeded through these stages until a determination could be made concerning the economic feasibility, engineering practicality and environmental effects of the alternative plans. The course of action recommended was the result of those analyses.

#### MANAGEMENT MEASURES

General. A "measure" is any structural or nonstructural means of resource management that addresses the planning objectives. It may be part of a plan or the entire plan. As the basis for formulating alternative plans, a broad range of measures was examined to identify those which could address planning objectives. The primary planning objective for this study was to reduce operating expenses and lost time and thereby increase revenues to users or potential users of the channel.

Without Project Condition (No Action). One possible measure considered was the "Without Project" alternative. It was based on the continuation of current activities and trends, with no changes or improvements. The existing channel is currently maintained by the City of Mexico Beach using an 8" pipeline dredge. This activity provides a 3-foot channel depth about 75% of the time, a 5-foot depth about 50% of the time, and a 6-foot depth about 10% of the time.

Other Measures. Other management measures which best met study objectives involved stabilized and unstabilized inlet alternatives. Management measures identified that would best satisfy the requirements for providing suitable dredged material disposal sites included nearshore disposal, beach renourishment, and diked upland disposal. The existing practice for disposing of dredged material involves disposing into a diked area immediately east of the inlet channel. These measures are discussed in greater detail in the paragraphs on alternative plans.

#### COST EVALUATION CRITERIA

For the plans considered, time and cost factors were determined for the construction equipment, dredge type, size, and operating characteristics. Dredge type and size depend mainly on availability, job duration, type of dredged material, environmental conditions, disposal constraints, and minimum production requirements. Construction and maintenance of considered plans would most likely involve pipeline dredges, since they are readily available in the appropriate size range and their pipelines lend themselves well to shore disposal. Accordingly, cost estimates were based on their use.

Channel improvement with hydraulic dredges involves the excavation and movement of sediments in suspension to remote disposal areas. Costs are determined by the type and quantity of material, disposal requirements, and production rates. Channel conditions were surveyed in August 1982, August 1984, and September 1985 to determine controlling depths in the harbor. To determine the type of material to be excavated, subsurface conditions were investigated in August 1984. Boring logs are in Appendix B.

#### BENEFIT EVALUATION

The benefits from channel improvement are the results of providing reliable depths for vessel use and are attributable to the net increase in revenues resulting from a more dependable channel and the reduced expenses from using other channels. Commercial benefits were based on the reduced operating expenses and associated increase in revenues for the charter fleet and reduced transportation costs to crews of shrimp boats. Recreational benefits were based on the unit day value as a proxy for willingness of the users to pay.

## PRELIMINARY SOLUTIONS

### CHANNEL DESIGN CONSIDERATIONS

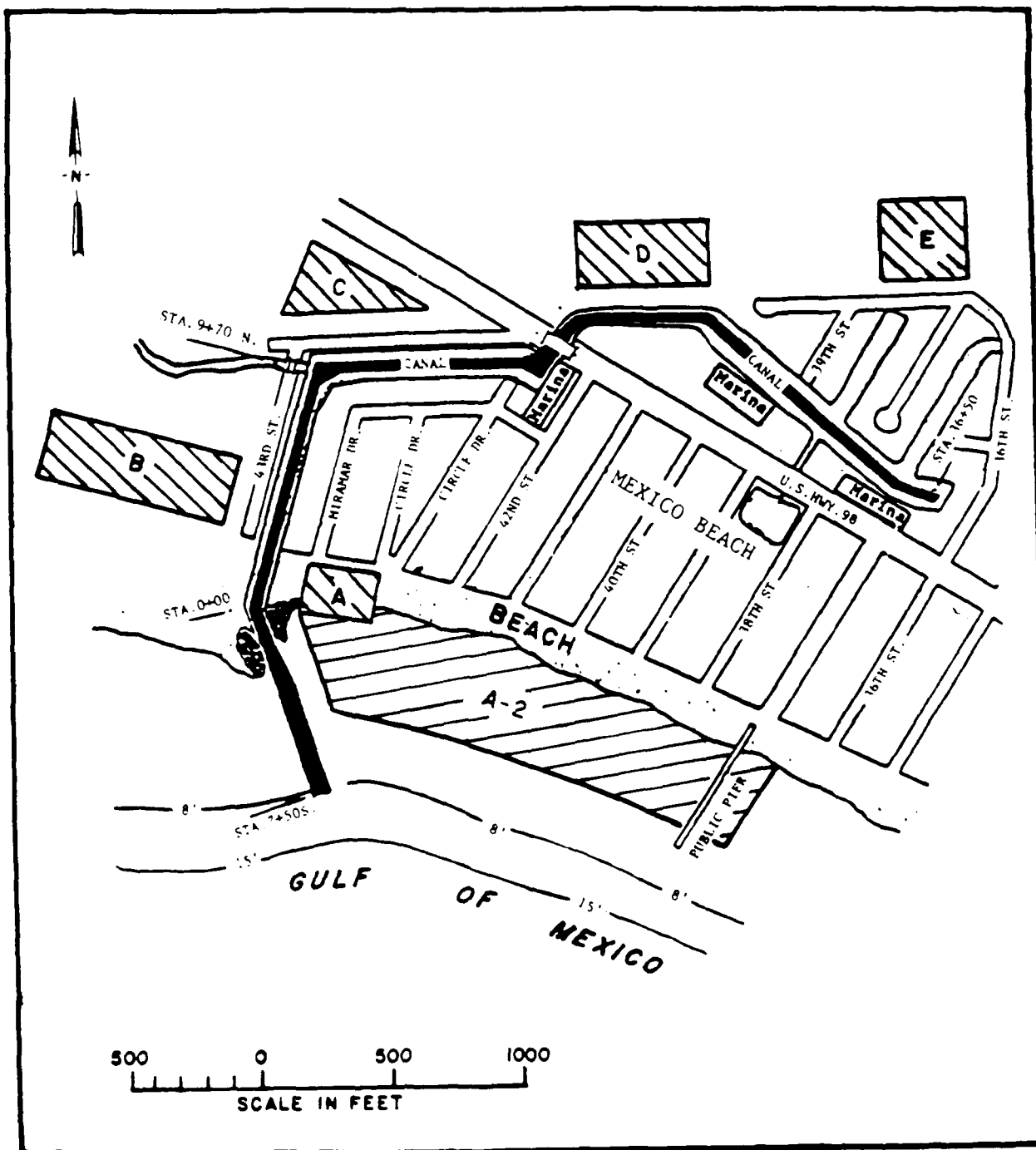
Channel design is presented in greater detail in Appendix D. The design of the various channel alternatives was based on Corps of Engineers design standards for shallow draft channels for small vessels. Based on the data gathered on the resident vessel fleet, the design vessel selected for preliminary channel design was a shrimp boat 65 feet long, 22 feet wide, and drawing 4.5 feet. When later economic analysis determined that the benefits for these craft from the proposed channel improvements was insufficient to justify dimensions for their accommodation, the larger charter fishing vessels were adopted as the design vessel, and conditions were checked for a vessel 42 feet long, 14 feet wide, and drawing 4 feet loaded.

Channel depths were designed for the vessel draft plus allowances for squat, wave conditions, and safety conditions. Summing the various recommended allowances results in a channel depth of 8.5 feet for the gulf channel and 7 feet for the interior segments. Other channel depths and underkeel clearances were evaluated, however, since it was learned that local users consistently operate at allowances less than those recommended.

Guidance on channel width is not as definitive as that for depth. However, one source recommends that the minimum channel width in open unprotected waters, such as the gulf leg at Mexico Beach, should be about 5 times the design vessel beam, resulting in a 70-foot wide channel for the original design vessels. Also, since strong cross winds can be hazardous to navigation, an increase in the gulf channel width to 100 feet was considered appropriate for greater safety. In protected waters inland, conditions are much calmer and users have better navigation references, therefore, the existing channel widths of 50 feet in the lower harbor below the Highway 98 bridge and 40 feet in the upper harbor above the bridge were considered adequate.

### DESCRIPTION OF DISPOSAL PLANS

Any improvement and maintenance of the channel would require dredging and disposal of dredged material. Therefore, disposal area identification and evaluation were a major part of plan formulation and will be discussed first. Six areas shown in Figure 6 were evaluated as possible disposal sites. Disposal area A is about 1.1 acres in size and is located on the beach on the east side of the channel. Disposal Area A-2 is about 13 acres in size and is a shallow water site located east of the existing channel within the 5-foot depth contour. Use of either site would nourish adjacent beaches presently starved from the



MEXICO BEACH, FLORIDA  
ALTERNATIVE DISPOSAL AREAS

FIGURE 6

loss of sand blocked by the existing jetties or trapped by the channel.

Disposal of the dredged sand in the indicated areas would have short term impacts. Disposal Area A is presently in use to receive sand removed from the inlet entrance, consequently additional disposal would not create any new impacts. The beach east of the inlet channel requires nourishment due to the loss of sand caused by the existing project. Use of site A-2 would renourish that portion of the eroding beach.

Site B is about 4.3 acres in area and is a disturbed area previously used some years ago for disposal. The area is adjacent to the primary dune system to the west and use of this site for disposal of suitable material would benefit by dune restoration. Placing additional sand on these areas would kill the sparse vegetation growing there. However, vegetation would reestablish within 2 years after channel construction and disposal activities.

Site C, about 1.7 acres in area, is sparsely vegetated with primarily xeric shrubs. This area has been previously disturbed from disposal of sandy material excavated from the channel near the mouth. Site D consists of 2.9 acres of cutover pineland with some areas of cattail. The dominant trees are pines, many in excess of 1 foot in diameter. The understory is dense and includes sweet bay magnolia and small live oaks. The use of this area for disposal would require clearing and therefore eliminate this forest. Revegetation would be by xerophytic herbs and shrubs and sand pines. Because of limited disposal capacities, both Sites C and D would require removal of excess material to accommodate a long term disposal plan. Availability of either site C or D is uncertain, however, as their use would conflict with local land use plans.

Disposal Area E contains primarily small pines, dwarf live oaks, and palmetto. As with Sites C and D, use of this 2 acre site would require removal of excess material to accommodate any of the plans considered.

Because of the conflict with land use plans, Areas C and D were eliminated from detailed study. Each of the channel improvement alternatives considered would involve the use of beach renourishment areas A and A-2; dune establishment at Site B; and removal of dredged material from the diked upland area at Site E. Use of Sites A and A-2 would be the most intensive with maintenance dredging and disposal activities occurring as frequently as bimonthly. Dune establishment at Site B would occur gradually in 5 year intervals over the 50-year life of the project until the dune attained an elevation of about 10 feet when it would conform to the average elevation of the adjacent dune line. Dredged material excavated from the canal segment

above the Highway 98 bridge consists of fine sand with a high organic content. Maintenance of this segment of the channel would require disposal of dredged material at Site E at 5-year intervals. That material would be removed by truck to restore the site capacity.

#### PRELIMINARY CHANNEL IMPROVEMENT PLANS

The older estimate of littoral drift, 75,000 cy annually, was used in the formulation of several plans of improvement in the earlier stages of the study, none of which were economically feasible. However, when the revised estimate of 181,200 cy annually became available, the costs shown in Table 8 were updated to reflect that increase and therefore provide meaningful comparisons with cost estimates for plans developed later. Costs of these preliminary plans were based on traditional methods of contract dredging, that is, contracting each time dredging is required and incurring the mobilization and demobilization costs with each occasion. The increase in the quantities to be dredged over the earlier littoral drift estimate affects both the mobilization and demobilization costs associated with the traditional contract method, as well as the yardage costs.

In addition, the traditional method does not adequately respond to the problem at Mexico Beach Inlet, because the increase in the estimated littoral transport indicates that the channel may shoal to complete impassibility several times a month, particularly during the winter months. Under these circumstances, traditional contract methods will not provide a channel with any degree of reliability. Other methods of contracting were also evaluated, therefore, and will be explained later in this report.

Benefits in subsequent tables reflect less than 100% channel availability, and are based on with project conditions provided by repetitive dredging. Based on the probability of dredge downtime due to maintenance, weather, and other factors, 100% availability was not assumed for any depth. As stated previously, repetitive dredging methods were investigated after receipt of CERC's WIS analysis, and were considered to be the only practical methods of keeping the channel open with an acceptable level of reliability. The traditional contracting method was used in developing the preliminary plan cost estimates although this method would provide a less reliable channel because of the delays inherent in the contracting process. The benefits are considered to be somewhat overstated for these plans, but corrections for contracting delays are difficult to estimate. The benefits shown were considered adequate for the purpose of plan comparison.

Details of the benefit computations are in Appendix C, Economic Investigations. Note particularly Table C-11, WIT'OUT PROJECT

CONDITION ECONOMIC ACTIVITY, Table C-15, WITH PROJECT CONDITION ECONOMIC ACTIVITY, and Table C-16, BENEFITS TO IMPROVED CHANNEL DEPTHS. From Table C-16, the annual benefits for a 4-foot and 4.5-foot channel depth are \$99,900, for a 5-foot channel they are \$203,900, and for a 5.5-foot channel benefits amount to \$204,200. There is no increase in benefits for channels deeper than 5.5 feet. Moreover, the difference between 5 and 5.5 feet of depth is only \$300, an insignificant difference not enough to justify the cost of additional channel depth.

#### COMPARISON OF CHANNEL DEPTHS

Preliminary information indicated that NED benefits would optimize at a 6-foot depth. Preliminary plans were formulated, therefore, for a 6-foot depth and the costs presented for Alternative Plans 1A through 2B are for that channel depth. Later information revealed that net benefits maximized at a depth of 5 feet. Channel depths of 4, 5, 6, and 7 feet (mean low water) were considered to determine the optimum scale of development, as shown in Table 7. The costs of Alternative Plan 1A, described above, were used in this analysis. Subsequent plans were based on a 5-foot optimum depth. Since these plans proved economically unfavorable at the additional depth, revision was not considered necessary.

TABLE 7  
BENEFITS AND COSTS (\$) OF ALTERNATIVE PLAN 1A  
FOR A RANGE OF INLET CHANNEL DEPTHS

	Inlet Channel Depth			
	4 feet	5 feet	6 feet	7 feet
FIRST COST	108,400	147,100	185,000	227,800
ANNUAL COSTS	376,100	380,000	384,100	387,900
BENEFITS	99,900	203,900	204,200	204,200
BENEFIT/COST RATIO	0.27	0.54	0.53	0.53

#### ALTERNATIVE PLAN 1A

This plan included channel modifications to provide a channel about 100 feet wide through the offshore bar which would transition to 50 feet wide through the existing jetties. The

length of the bar channel would vary with the depth and location of the offshore bar, but would average about 750 feet. The channel would be 50 feet wide north of the jetties for a distance of about 1900 feet, up to at the Highway 98 bridge. That bridge has 20 feet of horizontal clearance and 14 feet vertical clearance (mean high water), effectively restricting the size of vessels beyond that point. On the north side of the bridge the channel would be reduced to a 40-foot width and continue for about 1700 feet, providing an overall inner channel 3,600 feet in length beginning at the inlet mouth. Vessel traffic in the canal north of the bridge would be essentially one-way. The plan view showing the channel and disposal area features of this alternative is shown in Plate 1. For this and the other initial plans, it was assumed that maintenance of the inner channel would be performed at 5 year intervals except in the immediate area of the jetties. It was anticipated that annual maintenance of the bar channel would be required, based on the original 75,000 cy drift estimate, but this is now known to be impractical.

#### ALTERNATIVE PLAN 1B

Alternative Plan 1B has channel and disposal features similar to Plan 1A but includes littoral drift impoundment areas adjacent to the channel, as shown on Plate 2. The area on the east side was included since the earlier drift estimates had a small but significant westerly component, which is no longer considered correct. The concept was considered as a method of reducing the frequency of channel maintenance dredging. It was originally anticipated that maintaining the impoundment areas would require the removal of approximately 13,000 cy of sand about 4 times annually for a total of 52,000 cy. Economic efficiency would, therefore, be gained through increased channel availability, and reduced frequency of channel maintenance. The later drift quantity estimate made clear that the east impoundment area was not required, but that maintaining the west area would require constant dredging. An impoundment area, therefore, offered little advantage without enlarging the size beyond all reasonable proportions. Among disadvantages, a substantial increase in size would impact the environment of significant area of bottom.

#### ALTERNATIVE PLAN 1C

Alternative Plan 1C also has channel and disposal features similar to Plan 1A and, in addition, would also include constructing and maintaining a jet pump sand bypassing system at the inlet mouth and an impoundment area adjacent to the channel at the outer bar. The inlet and outer bar channel features are shown in Plate 3. This system would require the placement of several submerged suction pumps beneath the channel which would be operated periodically to remove shoaled material. Preliminary

design provided for six jet pumps to be installed 15 feet below the existing channel bottom. The jet pumps would be operated one at a time, and each would be connected by separate supply and discharge pipes to the pump house. The pump house would contain a 150 continuous-horsepower centrifugal pump to provide water to drive the jet pumps. Each jet pump would have a design pumping capacity of 65 cy per hour. The system could be operated by one person if an electric motor was used in the pump house. Maintenance would include the usual care given to pumps and motors, plus an occasional requirement for divers to clean trash from the jet pump screens. The proposed system would provide a 6-foot channel depth in the inlet mouth. A portable dredge would be used to construct and maintain the channel through the offshore bar and adjacent impoundment areas as well as the inner channel. It was originally estimated that maintenance would be performed twice annually on the bar channel and impoundment areas. With the increased estimate in drift volume, this is impractical. Like the plans previously described, maintenance of the inner canal would be performed in 5 year intervals.

#### ALTERNATIVE PLAN 2A

Alternative Plan 2A would provide the same channel and disposal features as Plan 1A with the addition of twin jetties adjacent to the existing concrete rubble jetties, and an impoundment basin adjacent to the west jetty. The jetty alignment would follow that of the existing jetties and be at an angle to the shoreline. The plan view is shown in Plate 4. Some of the existing rubble would be redistributed to portions of the new structure as needed to provide maneuvering clearances of the floating platform supporting the construction equipment and materials. The west rubble mound structure would begin at high ground adjacent to the existing concrete rubble structure on the west side and extend seaward about 510 feet to the 8-foot depth contour. The crown width would be 12 feet for the jetty head and 10 feet for the jetty trunk. Top elevation would be 6.0 feet for the jetty trunk and 8.0 feet for the jetty head. The east jetty structure would begin 70 feet east of the existing concrete structure on the east side and extend seaward about 300 feet to the 6-foot depth contour. The jetty system would be supplemented with periodic channel maintenance and sand bypassing. Based on the original drift estimate, it was anticipated that this plan would require maintenance dredging every five years to remove about 30,000 cy of material. Sand from the impoundment area, 70,000 cy, was to be bypassed on an annual basis, along with some channel maintenance at the jetty entrance, and placed in areas A and A-2. The offshore bar was to be included in the impoundment area and would be removed at each dredging cycle. Removal of the bar would probably result in temporary erosion of the shoreline and lowering of the nearshore profile in that immediate vicinity. The shoreline and offshore bar would reestablish naturally.

providing material storage, and the operation would be repeated the following year. With the increase in estimated drift volume, the plan, as formulated, is impractical. Costs were increased to permit comparison, but reformulation would be required prior if this plan were to be considered further.

#### ALTERNATIVE PLAN 2B

Alternative Plan 2B is similar to Plan 2A but would have a single jetty on the west side of the channel and provide an impoundment area on the east side as shown in Plate 5. Again, it was originally anticipated that, in addition to the annual sand bypassing of approximately 70,000 cy from the west impoundment area, this plan would require maintenance dredging of the inlet channel and east impoundment area on the average of every three years to remove approximately 45,000 cy of material which would be placed in disposal area A and A-2 to nourish the downdrift beach. The problems inherent in the greater estimated volume of drift occur with this plan also.

#### COMPARISON OF PRELIMINARY PLANS

Two basic preliminary alternative plans were considered. These were an unstabilized channel and a stabilized channel. Three methods of providing an unstabilized channel (Alternative Plans 1A, 1B, and 1C) and two methods of providing a stabilized channel (Alternative Plans 2A and 2B) were investigated for the Mexico Beach inlet. A summary comparison of these alternatives is shown in Table 8.

TABLE 8  
SUMMARY ECONOMIC DATA FOR PRELIMINARY PLANS

ALTERNATIVE PLAN	1A	1B	1C	2A	2B
-----					
FIRST COST	\$185,800	\$240,800	\$707,000	\$1,248,700	\$978,700
ANNUAL CHARGES	384,100	449,100	325,600	449,900	466,500
BENEFITS	204,200	204,200	204,200	204,200	204,200
B/C RATIO	0.53	0.45	0.63	0.45	0.44

## FINAL ALTERNATIVES CONSIDERED

The revised sediment transport quantity (an average of 181,000 cy annually) showed that the only practical means of providing a reliable channel would require that a dredge be on-site the year around, as some months' quantities exceeded the channel volume by 2-3 times. Traditional contracting methods become unpractical when the associated numerous mobilization and demobilization costs are considered. Accordingly, costs were developed for 2 methods of keeping a dredge on-site all year. These two methods are described below as Plans 3 and 4.

### ALTERNATIVE PLAN 3

This plan considered contracting for the necessary dredging. The contractor would be required to stay on-site and dredge as conditions required to maintain channel depth. The contractor would, therefore, be paid once each year for mobilization and demobilization, but would be paid for downtime at a rate that would cover his fixed costs. This plan would provide the same channel widths and lengths and disposal area features of the preliminary plans. As discussed earlier, costs were estimated for an optimum 5-foot deep channel. For this plan, and the others using constant dredging, all sand removed from the entrance channel would be placed in the downdrift nearshore zone to mimic natural transport.

### ALTERNATIVE PLAN 4

This plan would require the purchase of a dedicated 10" pipeline dredge. The dredge would then, as in Plan 3, be available on-site all year. It was considered that custody of the dredge and attendant plant and responsibility for operation would be transferred to the local sponsor. This plan would provide the same channel widths and lengths and disposal area features of the preliminary plans. Costs were estimated for an optimum 5-foot deep channel.

The costs and benefits of these two plans and the two that follow are shown in Table 9. Detailed cost estimates are found in Appendix E.

### SEASONALITY OF BENEFITS AND COSTS

The sediment transport analysis showed a definite seasonal pattern in the shoaling rates, with shoaling much higher in the winter than the other months of the year. Because of this, channel usage patterns were analyzed to determine if there was a similar seasonal pattern in the traffic. It was found that practically no commercial traffic used the channel in the winter

months (November through February), and no commercial benefits accrued to keeping the channel open during those months. The costs, and benefits, for providing a reliable channel 8 months out of the year, under the two methods provided by Alternative Plans 3 and 4, were determined and these alternative plans were then called 3A and 4A. If the channel is allowed to shoal completely during these 4 months, no recreational benefits will accrue during this period. Recreational benefits at Mexico Beach had been computed on an annual basis only, however, data obtained from numerous recreational sites throughout the Mobile District indicate that no more than 15% of the annual benefits accrue during the winter months. That ratio was considered sufficiently accurate to use in reducing the recreation benefits for a seasonal comparison. A comparison of these plans is also shown in Table 9.

TABLE 9  
ECONOMIC SUMMARY OF FINAL ALTERNATIVES

ALTERNATIVE PLAN	3	3A	4	4A
FIRST COST	\$177,000	\$144,800	\$533,600	\$517,200
ANNUAL CHARGES	632,500	410,000	252,500	210,300
BENEFITS	203,900	173,300	203,900	173,300
BENEFIT/COST RATIO	0.32	0.42	0.81	0.82

#### FINDINGS AND RECOMMENDATIONS

Extensive consideration was given to a number of alternative plans, none of which proved to be economically feasible. Based on the foregoing analysis, I recommend that no Federal action be taken at this time to adopt, improve, and maintain the existing navigation channel at Mexico Beach, Florida.



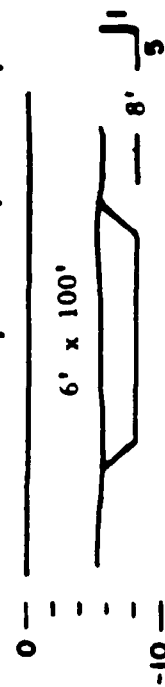
LARRY S. BONINE  
Colonel, Corps of Engineers  
District Engineer

## AFTERWORD

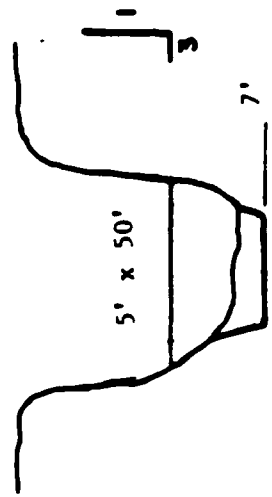
When it became apparent that a "no project" recommendation would be made, the Mobile District located an American Marine Machine Company 8-inch portable dredge which had been listed for disposal at MacDill AFB in Florida and gave this information to the City of Mexico Beach. The City was able to obtain that dredge for the cost of transportation through the surplus property disposal procedure. It is now in use maintaining Mexico Beach Inlet.



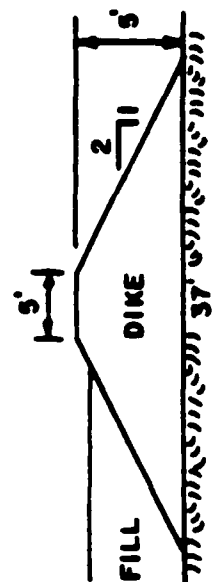
DISTANCE IN FEET FROM E  
100 W. 50 0 50 E 100



TYPICAL CHANNEL SECTION



TYPICAL CANAL SECTION  
LOWER HARBOR



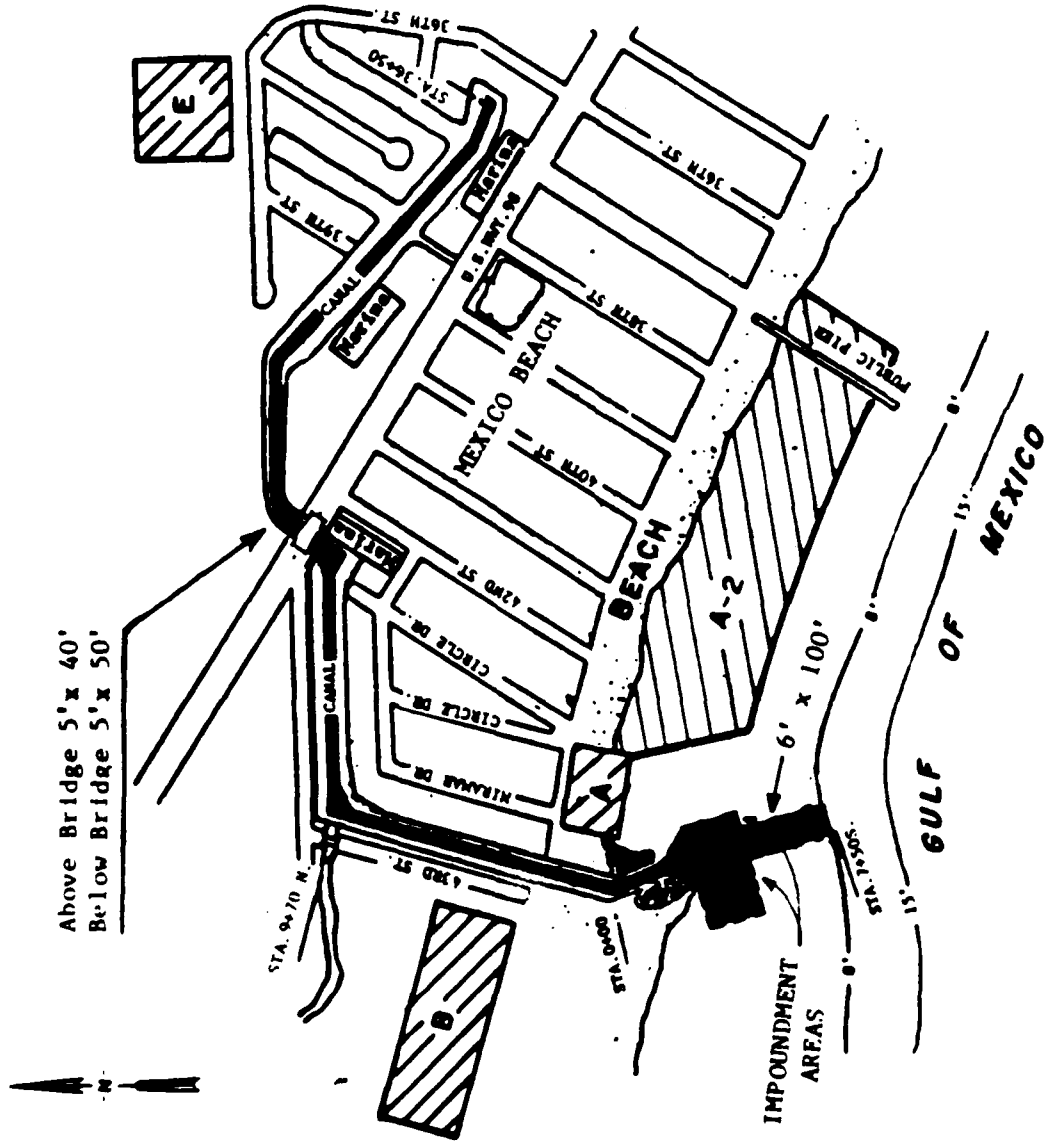
TYPICAL DIKE SECTION

MEXICO BEACH, FLORIDA

UNSTABILIZED CHANNEL PLAN  
WITH IMPOUNDMENT AREAS

ALTERNATIVE 1-B

PLATE 2



Above Bridge 5' x 40'  
Below Bridge 5' x 50'



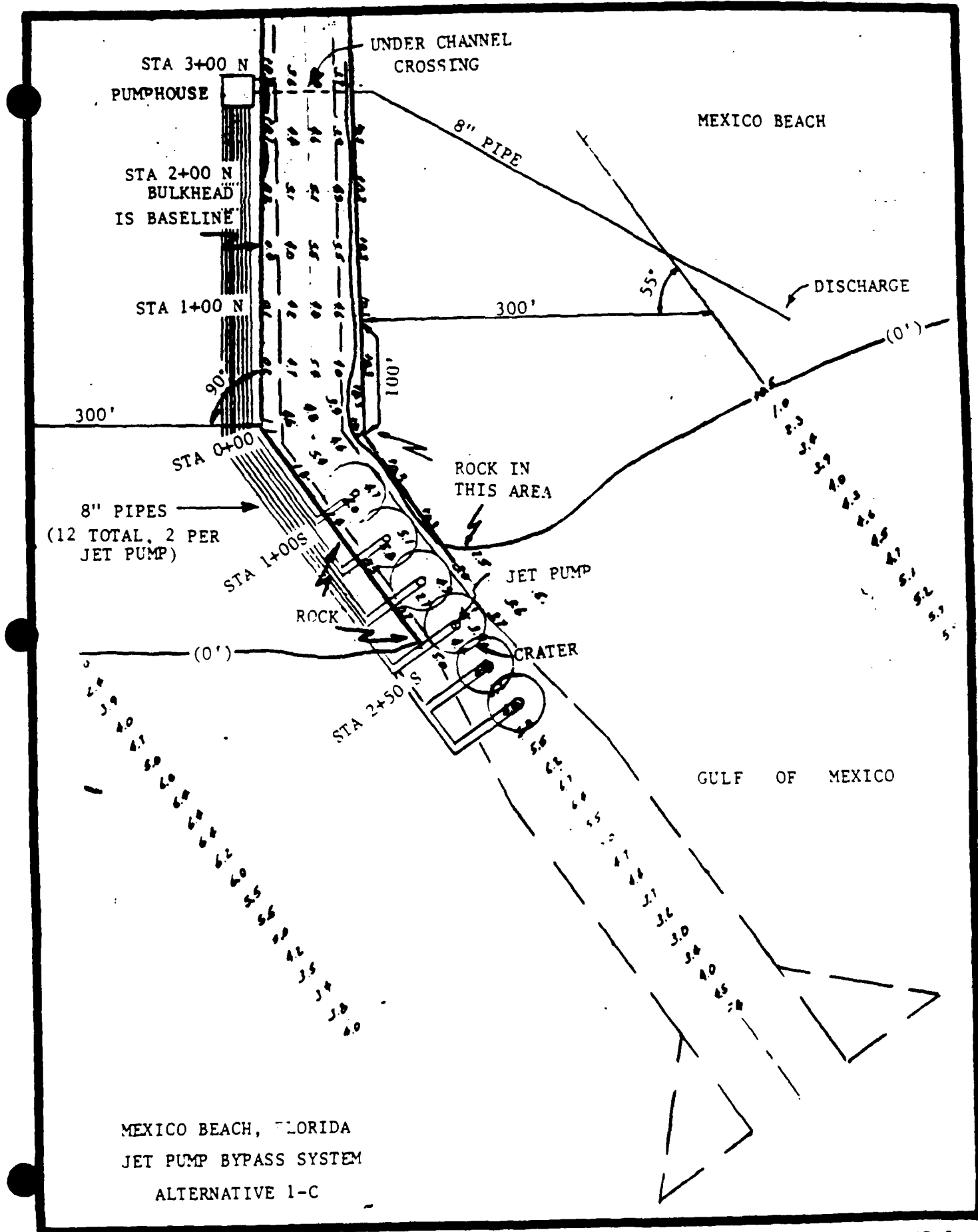
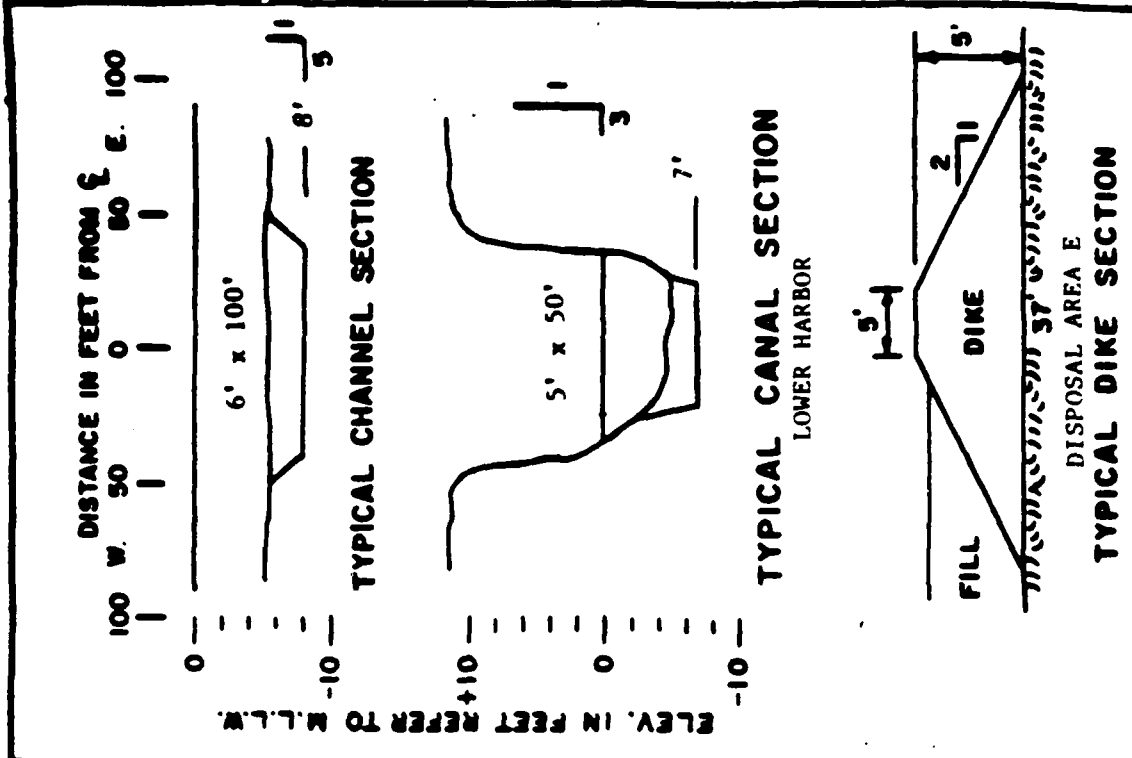
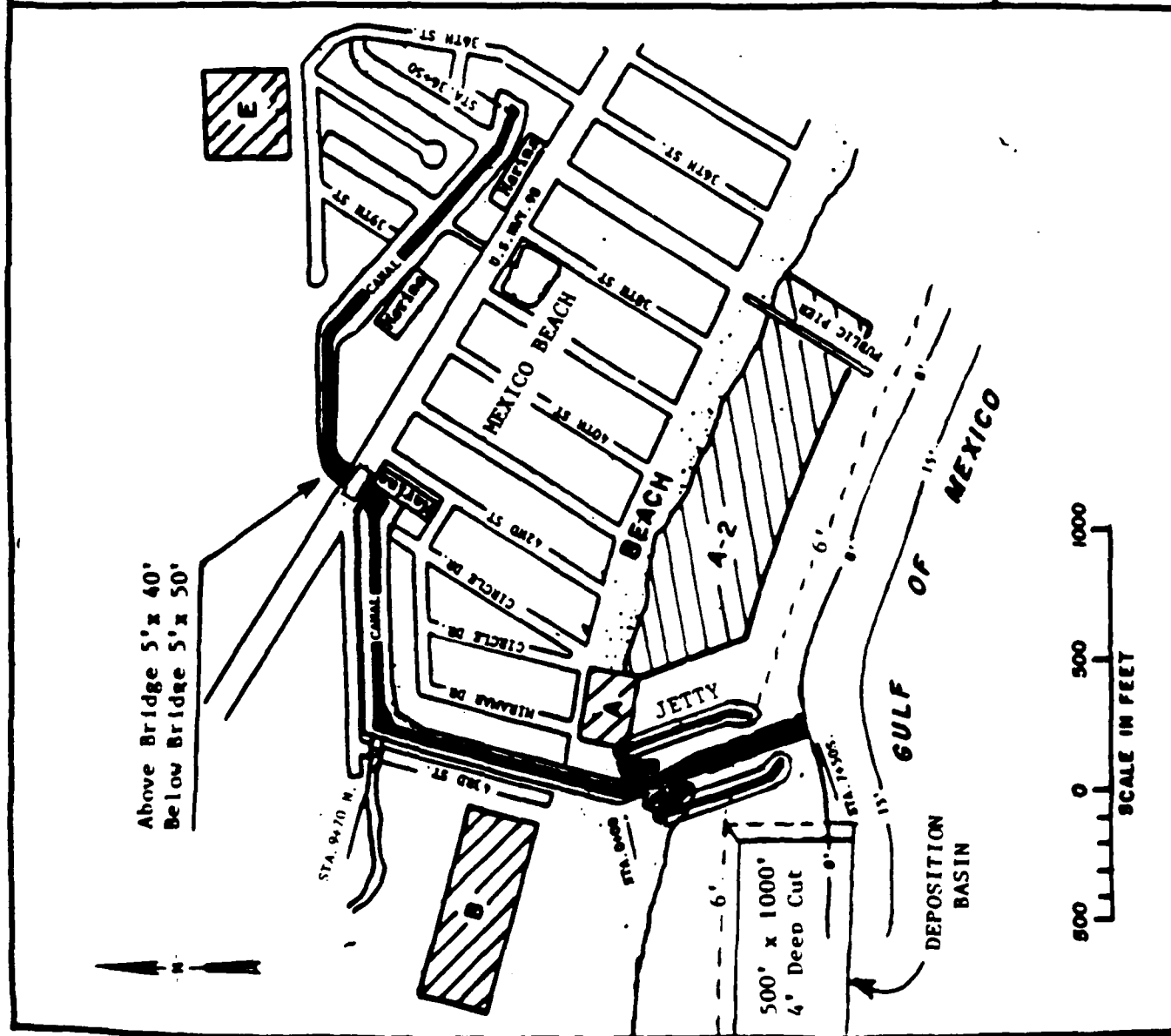
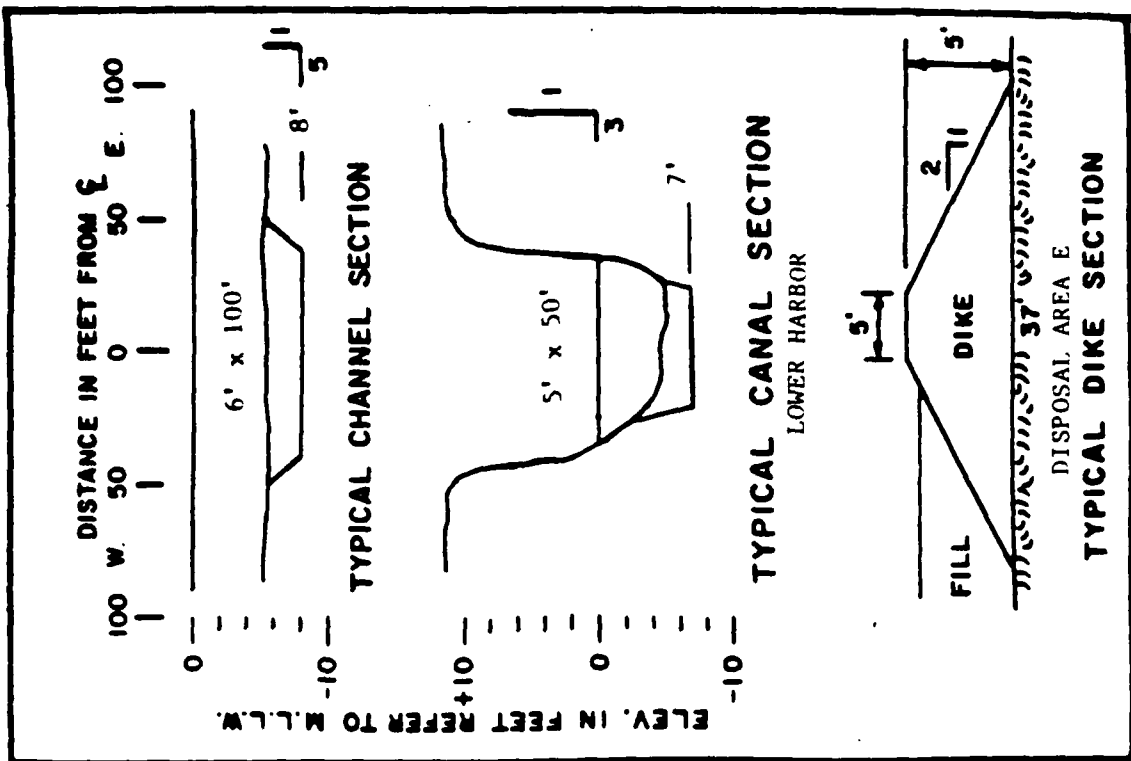
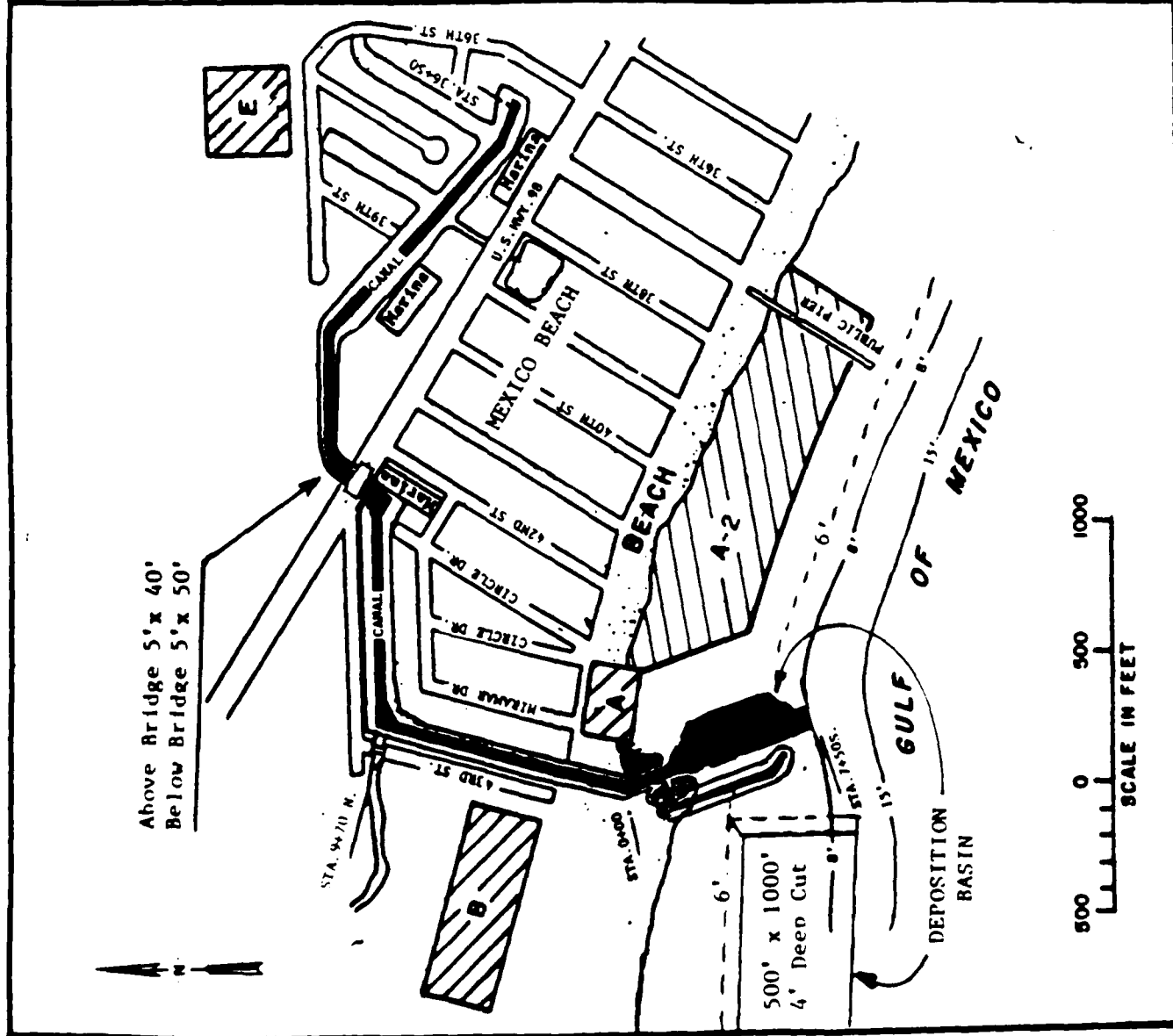


PLATE 3



**MEXICO BEACH, FLORIDA**  
 STABILIZED CHANNEL PLAN  
 WITH TWO JETTIES  
 AND DEPOSITION BASIN  
 ALTERNATIVE 2-A  
 PLATE 4



**MEXICO BEACH, FLORIDA**

STABILIZED CHANNEL PLAN  
WITH SINGLE JETTY AND  
DEPOSITION BASINS

ALTERNATIVE 2-B

PLATE 5

MEXICO BEACH, FLORIDA

APPENDIX A  
WAVE CLIMATE AND SEDIMENT TRANSPORT STUDY



DEPARTMENT OF THE ARMY  
WATERWAYS EXPERIMENT STATION, CORPS OF ENGINEERS  
P.O. BOX 631  
VICKSBURG, MISSISSIPPI 39180-0631

REPLY TO  
ATTENTION OF

WESCR-0

21 JAN '87

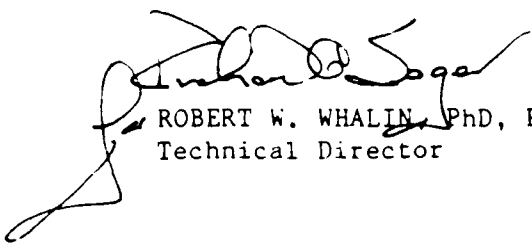
SUBJECT: Wave Climate and Sediment Transport Estimates Near  
Mexico Beach, Florida

Commander  
U.S. Army Engineer District, Mobile  
ATTN: SAMPD-N (Ms. Sandra Barrineau)  
P.O. Box 2288  
Mobile, AL 36628-0001

1. We are submitting a Memorandum for Record presenting the results of the subject study (encl 1).
2. If you have any questions regarding this study, please contact Ms. Rebecca Brooks (FTS 542-2406).

FOR THE COMMANDER AND DIRECTOR:

Encl

  
ROBERT W. WHALIN, PhD, PE  
Technical Director



DEPARTMENT OF THE ARMY  
WATERWAYS EXPERIMENT STATION CORPS OF ENGINEERS  
P.O. BOX 631  
VICKSBURG, MISSISSIPPI 39180-0631

REPLY TO  
ATTENTION OF

WESCR-0

6 January 1987

MEMORANDUM FOR RECORD

SUBJECT: Wave Climate and Sediment Transport Estimates near Mexico Beach,  
Florida

Introduction

1. The study to provide preliminary nearshore wave and longshore sediment transport estimates for the Mexico Beach, FL, coast was sponsored by the U.S. Army Engineer District, Mobile (SAM). This letter report provides SAM with an overview of the analytical methods used and a brief description of the resultant data. The data were tabulated and electronically transmitted to SAM on 21 November 1986. Copies of these tables are included in this report (encls 1 and 2).

Wave Hindcast Background

2. The input wave data used in the Mexico Beach, FL, study were generated in a previous study also funded by SAM. In the earlier study, a 13-year time series of wave height, period, and direction at 3-hr intervals was derived from the Wave Information Study (WIS) hindcast for the Gulf of Mexico. The time series does not include hurricane generated waves. The transformation technique described in WIS Report 8 (Jensen, 1983) was used to produce wave estimates for the period of record, 1 January 1956 through 31 December 1968 (37,992 cases). The wave processes involved in the calculation include air-sea interaction, refraction, and shoaling, assuming straight and parallel bottom contours. Also, sheltering of wave energy approaching Mexico Beach from the east and southeast was taken into account by WIS. The initial WIS hindcast records were transformed to estimates representative of the 30-ft depth using Jensen's (1983) numerical technique. The letter report dated 29 September 1986 provided SAM with this data set.

ROUTING:

1. C/Coastal Oceanography Branch *1/17*
2. ~~C/Research Division~~ *1/17*
3. Asst Chief, CERC *1/17*
4. ~~C/CERC~~ *1/17*
5. *1/17*
6. ~~Darla Sanders (WESCR-0)~~ *1/17, 14 Jan*

A-2

HYDRAULICS  
LABORATORY

GEOTECHNICAL  
LABORATORY

STRUCTURES  
LABORATORY

ENVIRONMENTAL  
LABORATORY

COASTAL ENGINEERING  
RESEARCH CENTER

INFORMATION  
TECHNOLOGY LABORATORY

ENC 1

SUBJECT: Wave Climate and Sediment Transport Estimates near Mexico Beach,  
Florida

### Transformation to Prebreaking Conditions

3. The bathymetry of the seaward region of Mexico Beach is complicated by two shoals (Figure 1), one to the south and the other to the east, which affect waves propagating from the Gulf of Mexico. In shallower water, the WIS transformation technique does not give the resolution and detail needed in this study because of the underlying assumptions in the method (bottom features on a scale less than 10 n.m. are not considered) and, therefore, could not be used. The Regional Coastal Processes wave model, "RCPWAVE - A Linear Wave Propagation Model for Engineering Use" (Ebersole et al. 1986), was selected as the initial computer algorithm in the process to transform the wave estimates at the 30-ft contour to prebreaking conditions at a nominal depth of 10 ft. The model employs an iterative, finite difference scheme including full refraction and diffraction effects produced by the sea bottom, assuming:

- a. Small bottom slopes.
- b. Linear, monochromatic, and irrotational waves.
- c. Negligible wave reflection.
- d. Negligible energy losses due to bottom friction or wave breaking outside the surf zone.

4. Model Grid. The bottom topography was defined by overlaying a rectangular grid with cell dimensions of 1600 ft by 1600 ft on a National Oceanic and Atmospheric Administration (NOAA) nautical chart (No. 11393). The bathymetry was digitized by assigning an average depth to each grid cell. A bilinear interpolation scheme was applied to define the final bathymetric grid at a resolution of 400 ft by 400 ft per cell. The depths were entered into the computer to use as model input.

5. Model Runs. RCPWAVE was modified to store output at the prebreaking depth (approximately 10 ft) for each alongshore grid line. Test runs of the model were made to verify the model was operating properly. It was noted that waves propagating to the northeast, approaching parallel to shore, caused model instability because waves refracted offshore. Therefore, the angle bands centered about -92 and -72 deg were not run (Figure 2). These angles are measured relative to the grid orientation for RCPWAVE, i.e., 0 deg represents shore normal and negative angles are located to the west of shore normal. Figure 2 also shows the region where, due to the St. Joseph Spit, wave energy at the 30-ft contour is sheltered from 140 to 180 deg relative to the WIS shoreline orientation.

6 January 1987

SUBJECT: Wave Climate and Sediment Transport Estimates near Mexico Beach,  
Florida

6. Production wave model runs were made in an innovative way to eliminate the cost of making a run for each offshore wave condition for the 13-year time series (37,992 runs). Instead, a total of 60 offshore wave conditions representing expected combinations of incoming wave period and direction was run. To maintain consistency and avoid interpolation in period space, the wave period intervals were based on the frequency bands used in the Gulf of Mexico offshore hindcast. The interval used for the mean wave direction was 20 deg.

7. A unit wave height (1 ft) was used for each period and direction combination. Since the model RCPWAVE is based on linear wave theory, the transformed unit wave height is equivalent to the combined refraction, diffraction, and shoaling coefficients (transformation coefficient). The output from the production runs consists of the transformation coefficient, wave period, and wave direction at approximately the 10-ft depth for each alongshore grid line. The results from all model runs were compiled into two matrices of transformation coefficients, one each for wave period and angle.

8. A program was developed to link the 13-year time series of hindcast wave results at the 30-ft depth to the results of the model runs to create a time series of wave height, period, and direction at the 10-ft depth at each of the six locations offshore of the Mexico Beach coastline (Figure 3). The program reads one record of the WIS 30-ft-contour hindcast data and defines a referencing index (key) based on wave period and direction. The key is used to extract the transformed wave conditions from each transformation matrix. By multiplying each input wave height by the appropriate transformation coefficient, all wave height estimates at the 30-ft depth were transformed to a water depth just outside the surf zone. This program created six output files, one for each coastal station shown in Figure 3. For each station the sequential output file contains the 13-year time series of wave heights, periods, and directions at the 10-ft depth.

#### Transformation to Breaking Conditions

9. The program used for the time series processing (Paragraph 8, above) also created files containing the surf-zone wave parameters for each of the six locations. Each station file contains the wave heights, periods, and directions that represent breaking conditions for the entire period of record. It should be noted that the locations shown in Figure 3 represent prebreaking grid points at a particular depth. The surf-zone wave parameters represent a range of depths less than the breaking depth ( $d_b$ ) and, therefore, cannot be plotted as a grid point. The surf-zone wave parameters were estimated from an algorithm developed by the staff at the U.S. Army Engineer Waterways Experiment Station's Coastal Engineering Research Center (Smith et al. 1985). Wave conditions were marched over straight and parallel bottom contours, where shoaling and refractive processes would occur up to the

SUBJECT: Wave Climate and Sediment Transport Estimates near Mexico Beach,  
Florida

breaking limit. The algorithm applied to calculate the surf-zone wave conditions employed the following equation:

$$H_b = 0.78 d$$

where,  $d$  is the water depth in feet and  $H_b$  is the resultant breaking wave height (Shore Protection Manual, 1984).

10. Certain meteorological influences were not considered when the prebreaking or breaking wave conditions were calculated. No hurricane winds or local winds were included in any of the wave calculations. Any calm conditions (zero wave height) occurring in the input data were carried through as calms to the surf-zone transformations. Also, any local wave generation was omitted from this processing. The effects of nearshore sea breezes, in particular, were neglected.

#### Results -- Waves

11. The wave-estimate results were provided for six locations offshore of the jetty system near Mexico Beach, Florida (Figure 3). As described in Paragraphs 8 and 9, two separate wave parameter files (data sets) were created for each coastal location. Enclosure 1 summarizes the prebreaking wave conditions for each station. The mean significant wave height, mean peak period, and mean direction of the wave angle are listed for each month and year, and for the entire 13-year period of record. Also, the number of calm conditions (no wave energy) is given for quantitative comparison purposes; all calm wave conditions were included in the mean wave height calculations.

#### Results -- Sediment Transport Potential

12. The longshore sediment transport estimates were calculated using the surf-zone wave parameters and the following equations from the Shore Protection Manual (1984):

$$P_{1s} = 0.0884 \rho g^{1.5} (H_{sb})^{2.5} \sin(2\alpha_b) \quad \text{Eq. 4-44}$$

$$Q = 7500 P_{1s} \quad \text{Eq. 4-50b}$$

13. Enclosure 2 presents the tabulated results of these transport estimates by month, year, and 13-year period of record. The estimates show the

SUBJECT: Wave Climate and Sediment Transport Estimates near Mexico Beach,  
Florida

potential to move sediment based on the hindcast wave conditions. The Shore Protection Manual (1984) lists sediment transport estimates for two Florida locations. However, these sites are too far away from Mexico Beach for a quantitative comparison of their respective Q amounts to be valid.

#### Impact of St. Joseph Bay

14. Since the St. Joseph Spit limits Gulf of Mexico wave propagation from the southeast (140 to 180 deg), an additional analysis was needed to determine if the sediment transport potential at Mexico Beach would be affected by local wave conditions in St. Joseph Bay. The initial step was to identify the periods of negligible wave energy (calms) at Mexico Beach. During these calm periods, the nearshore zone would not be appreciably influenced by previous synoptic-scale events; and, the local winds generated in St. Joseph Bay could propagate waves toward Mexico Beach.

15. Table 1 summarizes the percent occurrence of wave heights and periods for all directions for Mexico Beach at the 30-ft contour. The sum of the "TOTAL" column indicates that almost 76 percent of the total number of cases were categorized. Therefore, the offshore wave climate contained approximately 24-percent calm conditions, where virtually no wave energy was computed during a 3-hour time step. A computer scheme was applied to categorize these local velocities and directions (Table 2). There were 9,705 occurrences of calm wave conditions at Mexico Beach during the 13-year period of record.

16. A further investigation of the offshore-hindcast data was performed to determine the intensity and directional distribution of the winds derived in St. Joseph Bay during the calm periods. The directional window that would allow wave energy to reach Mexico Beach (120 to 160 deg) lies within the same quadrant as the sheltering conditions used for the 10-ft and surf-zone wave climate calculations (Figure 4). The results of a computer search of the local wind fields within this quadrant are presented in Table 3. During the entire 13-year period of record, there were only 55 occurrences of winds within the 40-deg directional window that could propagate waves toward Mexico Beach. The dates, wind speeds, and directions are listed in Table 4.

17. The deepwater JONSWAP growth rate expressions (Shore Protection Manual, 1984) were employed to compute the wave height and wave period estimates of the wave growth potential winds in St. Joseph Bay. The input wind conditions were adjusted previously to over-water winds at the 10-m level (33 ft). The wave height, period, duration, and fully developed wave conditions are given in Table 4. Assuming the hindcast winds were constant for a 3-hr period, all wave estimates were fetch-limited except two; these occurred on 28 November 1958 at 1200 (58112812) and 6 October 1968 at 0300 (68100603). Since these two cases were duration limited rather than fetch limited, the wave heights and periods would be reduced to 1.2 ft and 2.8 sec, respectively. In fact,

6 January 1987

SUBJECT: Wave Climate and Sediment Transport Estimates near Mexico Beach,  
Florida

there were no cases where fully developed wave conditions could have been generated.

18. The winds in this data set with wave growth potential were not constant for a long enough period of time for fully developed conditions to exist. In addition, these winds represent a nominal percentage (approximately 0.15 percent) of the total winds during the 13-year hindcast period. Therefore, the wave estimates derived from hindcast wind speeds and directions in St. Joseph Bay are not expected to significantly affect the sediment transport potential at Mexico Beach. They were not included in the final tabulated estimates (encls 1 & 2).

#### Summary

19. In an earlier study, a transformation technique was applied to the WIS Gulf of Mexico hindcast data to produce wave estimates at the 30-ft contour for Mexico Beach, Florida. Prebreaking wave estimates were calculated using these offshore parameters and the computer algorithm, RCPWAVE. To minimize both time and computer costs, a total of 60 offshore wave conditions representing expected combinations of incoming wave period and direction was run. The results of all model runs were compiled into two transformation matrices. A program that linked the WIS 30-ft-contour hindcast data to the results of the RCPWAVE model runs transformed all offshore wave estimates to a nominal depth just outside the breaker zone (encl 1). The surf-zone wave height estimates were generated by employing an established empirical relationship. The breaking conditions used in this study may yield conservative estimates for the sediment transport potential. The tabulated Q values represent the potential for littoral drift; they are not necessarily actual sediment transport amounts (encl 2).

20. The estimates do not include the effects of hurricanes or local winds. The importance of local winds over St. Joseph Bay was found to be negligible. The effects of other local winds are also expected to be small. Hurricanes will be added to the WIS data base during FY 87.

2 Encls

*Rebecca M. Brooks*

REBECCA M. BROOKS  
Mathematician, Coastal Oceanography Branch  
Coastal Engineering Research Center

### References

Ebersole, B. A., Cialone, M. A., and Prater, M. D. March 1986. "Regional Coastal Processes Numerical Modeling System; Report 1, RCPWAVE - A Linear Wave Propagation Model for Engineering Use," Technical Report CERC-86-4, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Jensen, R. E. September 1983. "Methodology for the Calculation of a Shallow-Water Wave Climate," WIS Report 8, U.S. Army Engineer Waterways Experiment Stations, Vicksburg, Miss.

Shore Protection Manual. 1984. 4th ed., 2 vols, U.S. Army Engineer Waterways Experiment Station, Coastal Engineering Research Center, US Government Printing Office, Washington DC.

Smith, O. P., Smith, J. M., Cialone, M. A., Pope, J., and Walton, T. L. September 1985. "Engineering Analysis of Beach Erosion at Homer Spit, Alaska," Miscellaneous Paper CERC-85-13, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

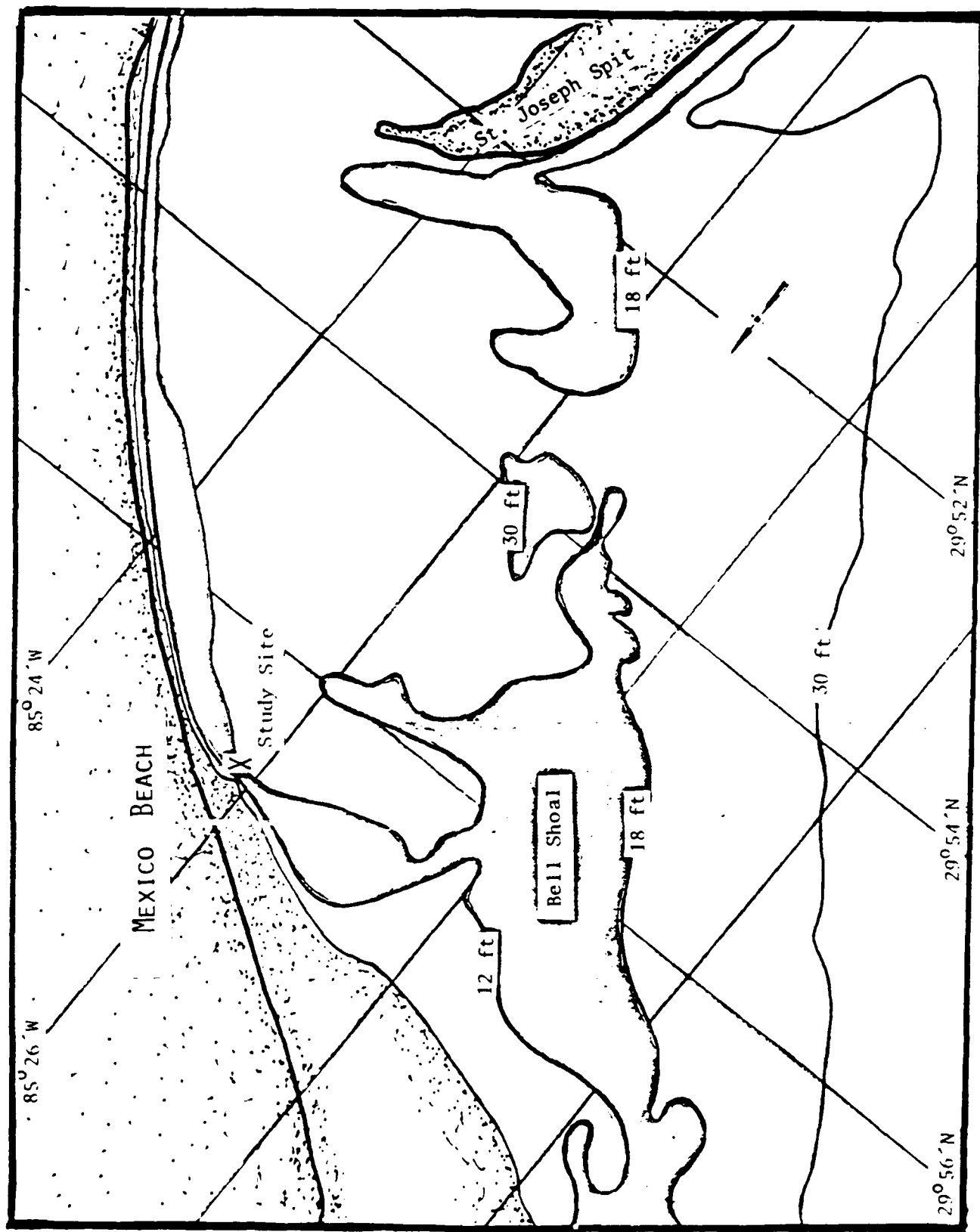


Figure 1. Two shoals offshore at Mexico Beach which affect wave propagation from the Gulf of Mexico.

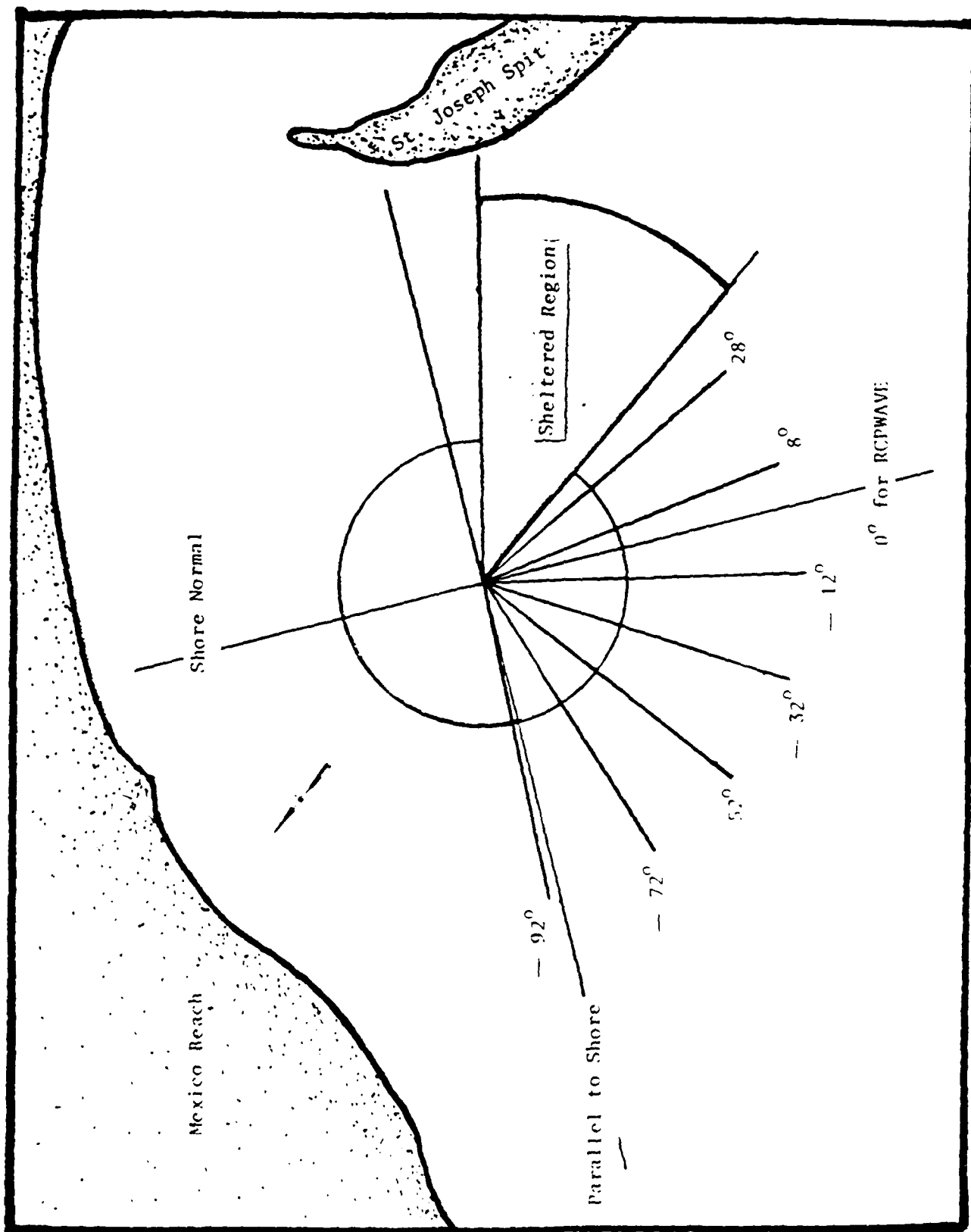


Figure 2. Wave approach angles used for RCPWAVE input, including angles which caused model instability. The sheltered region shown was used in all wave conditions calculations.

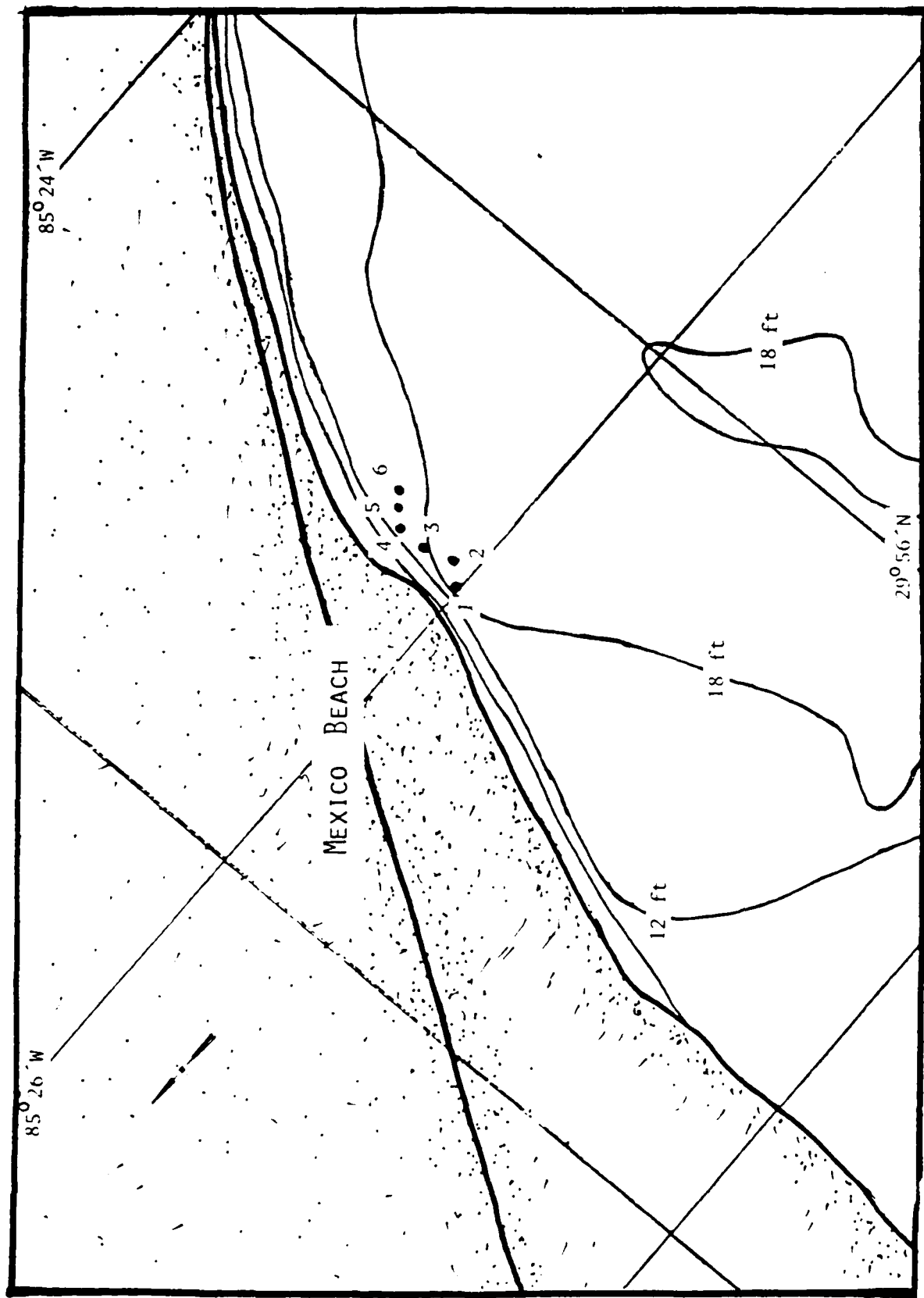


Figure 3. Locations of the 6 sediment transport stations for Mexico Beach, Florida.

TABLE 1. PERCENT OCCURRENCE OF WAVE CONDITIONS OFFSHORE AT MEXICO BEACH

STATION 1 13 YEARS FOR ALL DIRECTIONS SHORELINE ANGLE = 139.0 DEGREES AZIMUTH WATER DEPTH = 30.00 FEET												
PERCENT OCCURRENCE(X100) OF HEIGHT AND PERIOD FOR ALL DIRECTIONS												
HEIGHT(FEET)	PERIOD(SECONDS)											
	0.0- 2.9	3.0- 3.9	4.0- 4.9	5.0- 5.9	6.0- 6.9	7.0- 7.9	8.0- 8.9	9.0- 9.9	10.0- 10.9	11.0- LONGER	TOTAL	
0.00 - 0.99	1181	755	1361	715	71	7	.	.	.	.	4083	
1.00 - 1.99	124	571	579	580	115	15	.	.	.	.	1976	
2.00 - 2.99	.	136	506	213	147	31	2	.	.	.	1017	
3.00 - 3.99	.	.	93	116	106	41	4	1	1	.	349	
4.00 - 4.99	.	.	1	27	40	10	7	1	2	.	115	
5.00 - 5.99	.	.	.	.	12	.	1	1	.	.	33	
6.00 - 6.99	.	.	.	.	1	.	1	1	.	.	1	
7.00 - 7.99	.	.	.	.	.	.	.	.	.	.	0	
8.00 - 8.99	.	.	.	.	.	.	.	.	.	.	0	
9.00 - 9.99	.	.	.	.	.	.	.	.	.	.	0	
10.00 - GREATER	1305	1462	2540	1651	492	104	14	4	3	0		
TOTAL	1305	1462	2540	1651	492	104	14	4	3	0	37992	
AVE HS(FT) = 1.2 MAX HS(FT) = 8.9 AVE TP(SEC) = 4.3 TOTAL CASES = 37992												

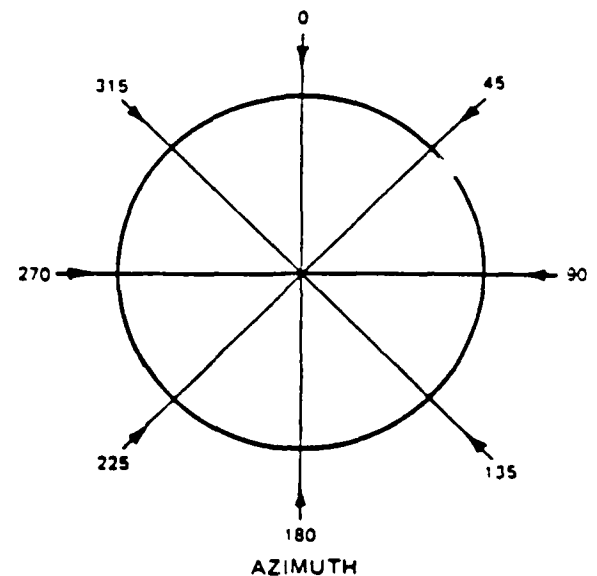
Table 2. OFFSHORE WINDS AT MEXICO BEACH

PERCENT OCCURRENCE OF WIND VELOCITY AND DIRECTION (X100)  
WIND SPEEDS ADJUSTED TO CONSTANT 10 M EL

WIND DIRECTION IN DEG AZIMUTH

WIND SPEED IN KNTS	0	22	45	67	90	112	135	157	180	202	225	247	270	292	315	337	TOTAL
0. - 1.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.0 - 3.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0 - 5.9	3	58	97	66	60	3	0	0	0	0	0	0	0	0	0	0	290
6.0 - 7.9	0	109	303	232	320	0	0	0	0	0	0	0	0	0	0	0	966
8.0 - 9.9	0	98	390	485	346	0	0	0	0	0	0	0	0	0	0	0	1320
10.0 - 11.9	5	102	676	583	445	19	1	0	0	0	0	0	0	0	0	1	1934
12.0 - 13.9	27	206	1017	861	379	53	4	0	0	0	0	0	0	0	0	0	2549
14.0 - 15.9	11	137	600	525	230	19	0	0	0	0	0	0	0	0	0	2	1523
16.0 - 17.9	11	112	457	245	100	2	0	0	0	0	0	0	0	0	0	1	920
18.0 - 19.9	21	62	198	78	9	0	0	0	0	0	0	0	0	0	0	2	373
20.0 - 21.9	16	32	71	4	6	0	0	0	0	0	0	0	0	0	0	3	133
22.0 - 23.9	3	19	29	1	1	0	0	0	0	0	0	0	0	0	1	2	57
24.0 - 25.9	2	7	5	0	0	0	0	0	0	0	0	0	0	0	0	1	15
26.0 - 27.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28.0 - 29.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30.0 - GREATER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	102	946	3849	3083	1900	97	5	0	0	0	0	0	0	0	0	13	

TOTAL NUMBER OF CALM WAVE CONDITIONS = 9705



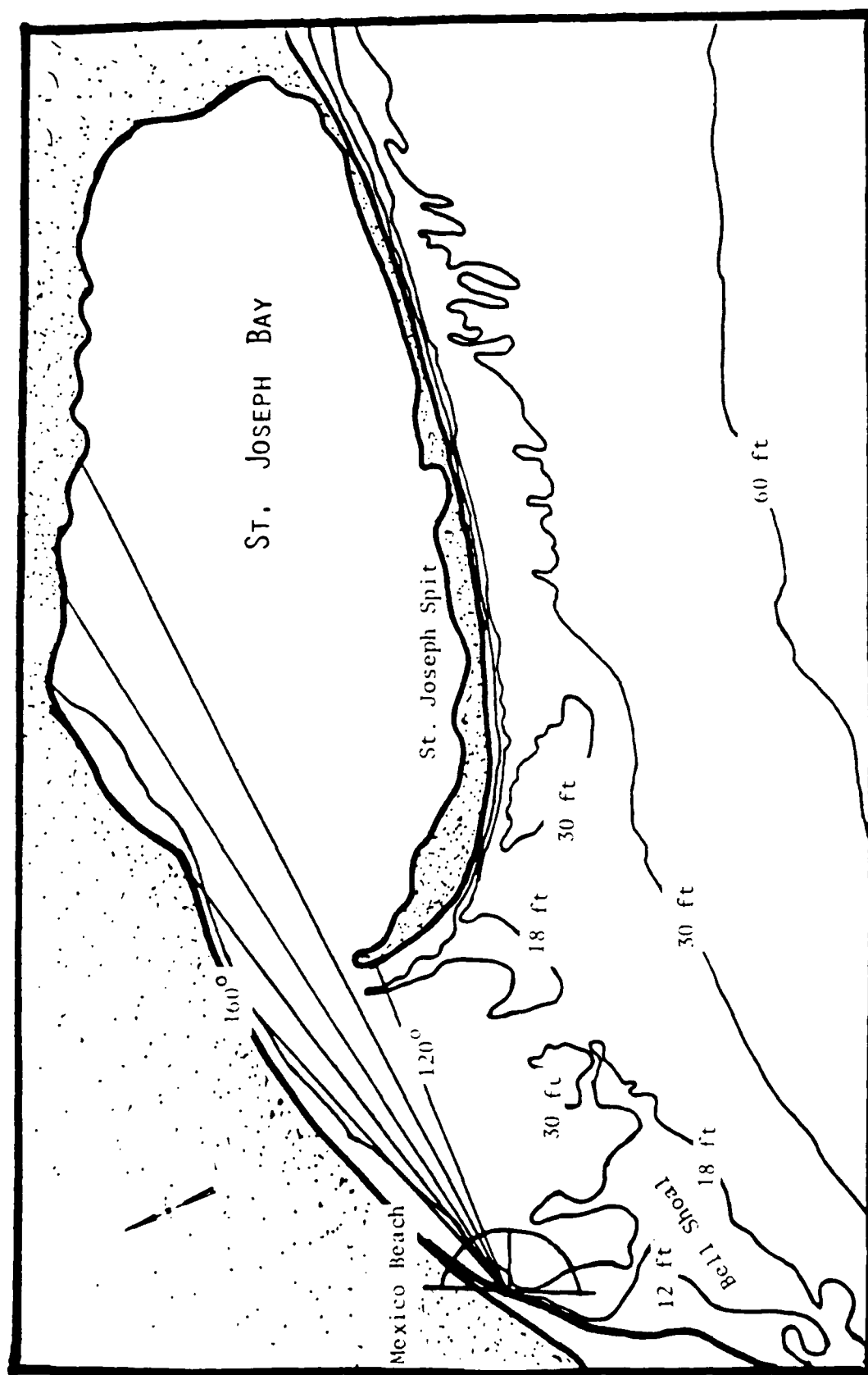


Figure 4. Wave-growth-potential directional window (120 to 160 degrees) from St. Joseph Bay to Mexico Beach.

Table 3.  
OFFSHORE WINDS AT MEXICO BEACH  
WINDOWED WAVE GROWTH POTENTIAL WINDS

PERCENT OCCURRENCE OF WIND VELOCITY AND DIRECTION (X100)  
WIND SPEEDS ADJUSTED TO CONSTANT 10 M EL

WIND DIRECTION IN DEG AZIMUTH

WIND SPEED IN KNTS	90	100	110	115	120	125	130	135	140	145	150	155	160	170	180	TOTAL
0. - 1.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2.0 - 3.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4.0 - 5.9	144	149	10	0	15	0	0	0	0	0	0	0	0	0	0	313
6.0 - 7.9	694	905	0	0	0	0	0	0	0	0	0	0	0	0	0	1599
8.0 - 9.9	1075	653	0	0	0	0	0	0	0	0	0	0	0	0	0	1728
10.0 - 11.9	1985	236	0	41	15	30	10	0	5	0	0	0	0	0	0	2325
12.0 - 13.9	1419	375	97	133	87	20	25	10	0	10	0	0	0	0	0	2181
14.0 - 15.9	740	329	82	51	36	10	0	0	0	0	0	0	0	0	0	1250
16.0 - 17.9	329	149	25	5	0	5	0	0	0	0	0	0	0	0	0	514
18.0 - 19.9	30	10	5	0	0	0	0	0	0	0	0	0	0	0	0	46
20.0 - 21.9	25	5	0	0	0	0	0	0	0	0	0	0	0	0	0	30
22.0 - 23.9	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
24.0 - 25.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
26.0 - 27.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
28.0 - 29.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30.0 - GREATER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	6450	2813	221	231	154	66	36	10	5	10	0	0	0	0	0	

TOTAL NUMBER OF CALM WAVE CONDITIONS = 1944

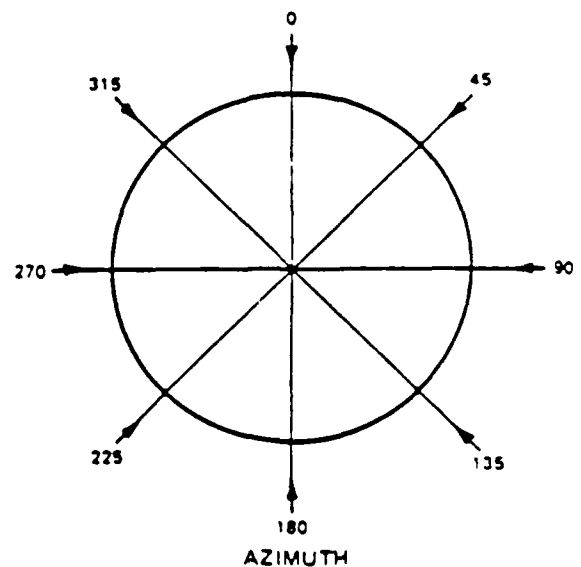


Table 4.

Wind and Wave Estimates for Potential Wave-Growth Conditions in St. Joseph Bay

DATE	WINDS		WAVE ESTIMATES			FULLY DEVELOPED	
	WS (kt)	WD (deg)	HMO (ft)	TP (sec)	TDUR (hr)	HMO (ft)	TP (sec)
56020815	13.	120.	0.66	1.8	1.1	3.64	5.6
56070212	4.	120.	0.20	1.2	1.6	0.36	1.7
57010403	11.	120.	0.56	1.7	1.2	2.59	4.7
57041621	14.	120.	0.72	1.8	1.1	4.23	6.0
58040903	12.	120.	0.62	1.7	1.1	3.12	5.1
58112812	12.	145.	1.54	3.2	3.8	3.12	5.1
59110403	11.	130.	0.82	2.2	1.9	2.59	4.7
59110406	12.	130.	0.89	2.2	1.9	3.12	5.1
60010100	13.	120.	0.66	1.8	1.1	3.64	5.6
60010103	13.	120.	0.66	1.8	1.1	3.64	5.6
60021306	13.	130.	0.98	2.3	1.8	3.64	5.6
60022106	11.	125.	0.56	1.7	1.5	2.59	4.7
60030212	12.	125.	0.72	2.0	1.4	3.12	5.1
60031421	11.	120.	0.56	1.7	1.2	2.59	4.7
60121015	15.	120.	0.75	1.9	1.0	4.85	6.4
60121503	13.	125.	0.79	2.0	1.4	3.64	5.6
61020606	15.	120.	0.75	1.9	1.0	4.85	6.4
61020609	15.	120.	0.75	1.9	1.0	4.85	6.4
61112206	11.	125.	0.66	1.9	1.5	2.59	4.7
61112209	12.	130.	0.89	2.2	1.9	3.12	5.1
62011000	12.	120.	0.62	1.7	1.1	3.12	5.1
63011721	13.	120.	0.66	1.8	1.1	3.64	5.6
63011800	12.	130.	0.89	2.2	1.9	3.12	5.1
63012612	11.	120.	0.56	1.7	1.2	2.59	4.7
63021821	15.	125.	0.92	2.1	1.3	4.85	6.4
63022403	12.	120.	0.62	1.7	1.1	3.12	5.1
63022406	11.	125.	0.66	1.9	1.5	2.59	4.7
63112603	13.	120.	0.66	1.8	1.1	3.64	5.6
63122221	12.	125.	0.72	2.0	1.4	3.12	5.1
64010609	12.	120.	0.62	1.7	1.1	3.12	5.1
64011203	12.	120.	0.62	1.7	1.1	3.12	5.1
64013103	12.	120.	0.62	1.7	1.1	3.12	5.1
64030103	11.	125.	0.66	1.9	1.5	2.59	4.7
64062312	4.	120.	0.20	1.2	1.6	0.36	1.7
64072021	4.	120.	0.20	1.2	1.6	0.36	1.7
64092706	13.	120.	0.66	1.8	1.1	3.64	5.6
64120215	12.	120.	0.62	1.7	1.1	3.12	5.1
64121621	13.	120.	0.66	1.8	1.1	3.64	5.6
64121700	12.	130.	0.89	2.2	1.9	3.12	5.1
64122903	12.	125.	0.72	2.0	1.4	3.12	5.1
65020606	14.	120.	0.72	1.8	1.1	4.23	6.0
65032303	11.	130.	0.82	2.2	1.9	2.59	4.7
65032306	11.	140.	1.08	2.6	2.8	2.59	4.7

Table 4. (Continued)

DATE	WINDS		WAVE ESTIMATES			FULLY DEVELOPED	
	WS (kt)	WD (deg)	HMO (ft)	TP (sec)	TDUR (hr)	HMO (ft)	TP (sec)
65090918	17.	125.	1.05	2.2	1.3	6.23	7.3
65100603	14.	125.	0.85	2.1	1.4	4.23	6.0
67102918	13.	120.	0.66	1.8	1.1	3.64	5.6
68010609	12.	120.	0.62	1.7	1.1	3.12	5.1
68010612	11.	125.	0.66	1.9	1.5	2.59	4.7
68010912	15.	120.	0.75	1.9	1.0	4.85	6.4
68100521	12.	120.	0.62	1.7	1.1	3.12	5.1
68100600	12.	135.	1.05	2.5	2.3	3.12	5.1
68100603	12.	145.	1.54	3.2	3.8	3.12	5.1
68120103	14.	120.	0.72	1.8	1.1	4.23	6.0
68120106	13.	135.	1.15	2.6	2.3	3.64	5.6
68122618	11.	125.	0.66	1.9	1.5	2.59	4.7

D E F I N I T I O N S

TSUM = TOTAL NUMBER OF OBSERVATIONS

CALM = NUMBER OF CALM WAVE CONDITIONS

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	64.	0.91	5.6	61.	56 1
	232.	58.	1.08	4.7	74.	56 2
	248.	69.	0.92	4.5	71.	56 3
	240.	54.	1.13	4.8	63.	56 4
	248.	139.	0.34	3.6	55.	56 5
	240.	60.	0.82	3.7	38.	56 6
	248.	39.	1.13	3.9	46.	56 7
	248.	16.	1.05	4.5	53.	56 8
	240.	157.	0.40	4.8	56.	56 9
	248.	167.	0.41	4.4	67.	56 10
	240.	95.	0.56	4.7	54.	56 11
	248.	89.	0.68	4.8	62.	56 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1007.	0.79	4.5	58.	1956

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	83.	0.94	4.6	57.	57 1
	224.	102.	0.88	4.7	66.	57 2
	248.	64.	1.01	4.9	64.	57 3
	240.	146.	0.45	5.0	80.	57 4
	248.	128.	0.65	4.2	77.	57 5
	240.	110.	0.78	4.5	76.	57 6
	248.	0.	1.12	4.7	56.	57 7
	248.	73.	0.99	4.7	44.	57 8
	240.	100.	0.89	4.7	79.	57 9
	248.	137.	0.39	4.4	57.	57 10
	240.	83.	0.74	4.5	63.	57 11
	248.	110.	0.55	5.1	66.	57 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1136.	0.78	4.7	65.	1957

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	93.	0.92	5.7	62.	58 1
	224.	53.	1.38	5.5	66.	58 2
	248.	63.	0.88	4.8	63.	58 3
	240.	48.	0.91	4.5	71.	58 4
	248.	147.	0.32	4.0	67.	58 5
	247.	108.	0.87	3.8	61.	58 6
	248.	99.	0.52	3.5	62.	58 7
	248.	51.	0.90	3.9	46.	58 8
	240.	154.	0.35	4.0	66.	58 9
	248.	185.	0.16	4.2	45.	58 10
	240.	139.	0.41	4.5	65.	58 11
	248.	150.	0.52	5.0	51.	58 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1290.	0.68	4.5	61.	1958

A-20

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	145.	0.49	4.6	62.	59 1
	224.	123.	0.70	4.6	73.	59 2
	248.	93.	0.81	4.7	63.	59 3
	240.	75.	0.74	4.4	67.	59 4
	248.	109.	0.52	4.6	71.	59 5
	240.	54.	0.76	4.1	64.	59 6
	248.	75.	0.67	4.0	67.	59 7
	248.	129.	0.75	4.5	51.	59 8
	240.	128.	0.75	5.1	66.	59 9
	248.	95.	0.68	4.7	71.	59 10
	240.	162.	0.29	5.1	68.	59 11
	248.	118.	0.51	5.2	64.	59 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1306.	0.64	4.6	66.	1959

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	62.	0.74	4.8	65.	60 1
	232.	91.	1.15	5.7	65.	60 2
	248.	99.	0.72	4.9	65.	60 3
	240.	134.	0.52	4.5	55.	60 4
	248.	90.	0.49	3.5	48.	60 5
	240.	114.	0.41	3.9	60.	60 6
	248.	16.	0.92	4.1	60.	60 7
	248.	125.	0.62	4.0	60.	60 8
	240.	156.	0.48	5.0	69.	60 9
	248.	166.	0.38	4.7	71.	60 10
	240.	176.	0.16	4.5	56.	60 11
	248.	174.	0.28	5.0	64.	60 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1403.	0.57	4.5	61.	1960

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	109.	0.69	5.3	56.	61 1
	224.	62.	0.84	4.7	66.	61 2
	248.	63.	0.78	4.4	69.	61 3
	240.	62.	0.92	4.9	64.	61 4
	248.	93.	0.49	3.8	59.	61 5
	240.	114.	0.45	4.2	66.	61 6
	248.	134.	0.30	3.0	50.	61 7
	248.	132.	0.54	3.9	59.	61 8
	240.	158.	0.90	6.5	73.	61 9
	248.	211.	0.06	5.5	52.	61 10
	240.	110.	0.53	4.5	64.	61 11
	248.	104.	0.70	4.9	68.	61 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1352.	0.60	4.5	63.	1961

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	96.	0.77	4.8	60.	62 1
	224.	44.	1.00	4.7	65.	62 2
	248.	104.	0.69	5.1	72.	62 3
	240.	75.	0.71	4.2	62.	62 4
	248.	104.	0.46	3.7	35.	62 5
	240.	124.	0.39	3.8	62.	62 6
	248.	23.	0.97	4.0	48.	62 7
	248.	106.	0.64	4.3	43.	62 8
	240.	160.	0.36	3.9	69.	62 9
	248.	166.	0.44	4.4	63.	62 10
	240.	129.	0.63	5.4	61.	62 11
	248.	125.	0.52	4.4	54.	62 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1256.	0.63	4.4	57.	1962

A-22

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	133.	0.62	4.6	67.	63 1
	224.	95.	0.70	5.0	63.	63 2
	248.	76.	0.75	4.5	71.	63 3
	240.	68.	0.94	4.3	63.	63 4
	248.	109.	0.58	3.5	39.	63 5
	240.	87.	0.98	3.9	61.	63 6
	248.	66.	0.89	4.1	48.	63 7
	248.	53.	0.74	4.3	44.	63 8
	240.	200.	0.18	4.4	48.	63 9
	248.	217.	0.05	5.1	46.	63 10
	240.	122.	0.45	4.9	65.	63 11
	248.	128.	0.52	4.7	58.	63 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1354.	0.62	4.4	57.	1963

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	89.	0.73	4.9	65.	64 1
	232.	80.	0.97	5.2	59.	64 2
	248.	99.	0.80	5.3	76.	64 3
	240.	88.	0.63	4.3	81.	64 4
	248.	119.	0.45	3.8	51.	64 5
	240.	122.	0.31	3.0	39.	64 6
	248.	88.	1.04	4.2	61.	64 7
	248.	66.	1.00	4.3	61.	64 8
	240.	170.	0.23	4.5	60.	64 9
	248.	174.	0.49	5.9	63.	64 10
	240.	142.	0.48	4.3	65.	64 11
	248.	171.	0.57	5.0	81.	64 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1408.	0.64	4.5	64.	1964

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	107.	0.92	5.2	62.	65 1
	224.	119.	0.55	4.8	73.	65 2
	248.	106.	0.73	4.8	67.	65 3
	240.	80.	0.77	4.3	66.	65 4
	248.	146.	0.24	3.5	59.	65 5
	240.	130.	0.52	4.1	68.	65 6
	248.	29.	0.90	3.7	58.	65 7
	248.	58.	1.08	3.9	55.	65 8
	240.	142.	0.67	5.2	76.	65 9
	248.	167.	0.42	5.1	58.	65 10
	240.	141.	0.74	4.9	68.	65 11
	248.	167.	0.25	4.3	62.	65 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1392.	0.65	4.4	63.	1965

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	139.	0.36	5.0	66.	66 1
	224.	96.	0.70	5.5	75.	66 2
	248.	92.	0.61	4.7	54.	66 3
	240.	62.	0.97	4.8	73.	66 4
	248.	76.	0.83	4.2	62.	66 5
	240.	154.	0.34	4.6	64.	66 6
	248.	72.	0.75	3.7	41.	66 7
	248.	72.	0.96	3.9	58.	66 8
	240.	59.	1.02	4.2	53.	66 9
	248.	191.	0.31	4.4	63.	66 10
	240.	149.	0.46	4.8	64.	66 11
	248.	106.	0.46	4.8	66.	66 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1268.	0.65	4.5	61.	1966

A-24

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	138.	0.51	5.0	72.	67 1
	224.	90.	0.67	4.5	70.	67 2
	248.	122.	0.64	4.4	63.	67 3
	240.	56.	0.87	4.1	59.	67 4
	248.	55.	1.22	4.3	58.	67 5
	240.	141.	0.54	3.7	45.	67 6
	248.	34.	0.97	4.1	53.	67 7
	248.	95.	0.81	3.6	52.	67 8
	240.	160.	0.31	4.3	44.	67 9
	248.	160.	0.36	4.5	60.	67 10
	240.	103.	1.15	5.0	55.	67 11
	248.	78.	0.86	4.6	71.	67 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1232.	0.74	4.3	59.	1967

MONTHLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	248	151.	0.44	4.6	62.	68 1
	232.	97.	0.63	5.1	53.	68 2
	248.	87.	0.82	4.8	60.	68 3
	240.	59.	0.89	4.1	57.	68 4
	248.	63.	0.98	3.8	53.	68 5
	240.	27.	0.85	4.9	49.	68 6
	248.	99.	0.68	3.8	49.	68 7
	248.	80.	0.57	4.0	43.	68 8
	240.	116.	0.49	3.6	58.	68 9
	248.	155.	0.27	4.4	48.	68 10
	240.	88.	0.82	5.0	63.	68 11
	248.	83.	0.84	5.0	67.	68 12
YEARLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1105.	0.69	4.4	55.	1968

THIRTEEN YEAR SUMMARY

GULF OF MEXICO STATION = 1 PB (PRE-BREAKING)

WATER DEPTH = 10.8 (FT)

SHORELINE ANGLE = 98.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

TOTAL NUMBER OF CALM CONDITIONS = 16509.

MEAN SIGNIFICANT HEIGHT = 0.67 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 60.5 DEGREES RELATIVE TO SHORELINE ORIENTATION

D E F I N I T I O N S

TSUM = TOTAL NUMBER OF OBSERVATIONS

CALM = NUMBER OF CALM WAVE CONDITIONS

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	64.	0.92	5.6	59.	56 1
	232.	58.	1.08	4.7	74.	56 2
	248.	69.	0.91	4.5	70.	56 3
	240.	54.	1.14	4.8	62.	56 4
	248.	139.	0.33	3.6	55.	56 5
	240.	60.	0.82	3.7	38.	56 6
	248.	39.	1.16	3.9	45.	56 7
	248.	16.	1.07	4.5	52.	56 8
	240.	157.	0.39	4.8	55.	56 9
	248.	167.	0.42	4.4	66.	56 10
	240.	95.	0.55	4.7	53.	56 11
	248.	89.	0.65	4.8	61.	56 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1007.	0.79	4.5	57.	1956

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	83.	0.95	4.6	66.	57 1
	224.	102.	0.89	4.7	65.	57 2
	248.	64.	1.01	4.9	63.	57 3
	240.	146.	0.44	5.0	80.	57 4
	248.	128.	0.67	4.2	77.	57 5
	240.	110.	0.77	4.5	76.	57 6
	248.	0.	1.16	4.7	55.	57 7
	248.	73.	1.01	4.7	43.	57 8
	240.	100.	0.87	4.7	79.	57 9
	248.	137.	0.38	4.4	56.	57 10
	240.	83.	0.73	4.5	62.	57 11
	248.	110.	0.54	5.1	64.	57 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1136.	0.79	4.7	64.	1957

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	93.	0.93	5.7	60.	58 1
	224.	53.	1.40	5.5	65.	58 2
	248.	63.	0.87	4.8	62.	58 3
	240.	48.	0.89	4.5	70.	58 4
	248.	147.	0.32	4.0	66.	58 5
	240.	108.	0.90	3.8	61.	58 6
	248.	99.	0.53	3.5	62.	58 7
	248.	51.	0.92	3.9	45.	58 8
	240.	154.	0.33	4.0	66.	58 9
	248.	185.	0.16	4.2	44.	58 10
	240.	139.	0.40	4.5	64.	58 11
	248.	150.	0.54	5.0	50.	58 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1290.	0.68	4.5	60.	1958

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	145.	0.48	4.6	61.	59 1
	224.	123.	0.72	4.6	73.	59 2
	248.	93.	0.79	4.7	63.	59 3
	240.	75.	0.74	4.4	66.	59 4
	248.	109.	0.52	4.6	71.	59 5
	240.	54.	0.77	4.1	63.	59 6
	248.	75.	0.70	4.0	66.	59 7
	248.	129.	0.77	4.5	50.	59 8
	240.	128.	0.77	5.1	65.	59 9
	248.	95.	0.68	4.7	70.	59 10
	240.	162.	0.28	5.1	67.	59 11
	248.	118.	0.49	5.2	62.	59 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1306.	0.64	4.6	65.	1959

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	62.	0.73	4.8	63.	60 1
	232.	91.	1.16	5.7	63.	60 2
	248.	99.	0.71	4.9	64.	60 3
	240.	134.	0.51	4.5	54.	60 4
	248.	90.	0.48	3.5	48.	60 5
	240.	114.	0.42	3.9	59.	60 6
	248.	16.	0.94	4.1	59.	60 7
	248.	125.	0.63	4.0	60.	60 8
	240.	156.	0.48	5.0	69.	60 9
	248.	166.	0.38	4.7	71.	60 10
	240.	176.	0.15	4.5	55.	60 11
	248.	174.	0.26	5.0	62.	60 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1403.	0.57	4.5	60.	1960

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	109.	0.68	5.3	54.	61 1
	224.	62.	0.82	4.7	65.	61 2
	248.	63.	0.75	4.4	69.	61 3
	240.	62.	0.90	4.9	63.	61 4
	248.	93.	0.49	3.8	58.	61 5
	240.	114.	0.43	4.2	66.	61 6
	248.	134.	0.30	3.0	50.	61 7
	248.	132.	0.55	3.9	58.	61 8
	240.	158.	0.95	6.5	73.	61 9
	248.	211.	0.06	5.5	49.	61 10
	240.	110.	0.51	4.5	63.	61 11
	248.	104.	0.68	4.9	67.	61 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1352.	0.59	4.5	62.	1961

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	96.	0.76	4.8	59.	62 1
	224.	44.	1.00	4.7	64.	62 2
	248.	104.	0.66	5.1	71.	62 3
	240.	75.	0.69	4.2	61.	62 4
	248.	104.	0.46	3.7	34.	62 5
	240.	124.	0.40	3.8	62.	62 6
	248.	23.	0.98	4.0	47.	62 7
	248.	106.	0.65	4.3	42.	62 8
	240.	160.	0.37	3.9	69.	62 9
	248.	166.	0.45	4.4	62.	62 10
	240.	129.	0.62	5.4	60.	62 11
	248.	125.	0.51	4.4	52.	62 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1256.	0.63	4.4	56.	1962

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	133.	0.62	4.6	67.	63 1
	224.	95.	0.68	5.0	62.	63 2
	248.	76.	0.74	4.5	70.	63 3
	240.	68.	0.95	4.3	62.	63 4
	248.	109.	0.59	3.5	39.	63 5
	240.	87.	1.01	3.9	61.	63 6
	248.	66.	0.91	4.1	48.	63 7
	248.	53.	0.75	4.3	43.	63 8
	240.	200.	0.18	4.4	48.	63 9
	248.	217.	0.05	5.1	44.	63 10
	240.	122.	0.43	4.9	64.	63 11
	248.	128.	0.51	4.7	56.	63 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1354.	0.62	4.4	56.	1963

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	89.	0.72	4.9	64.	64 1
	232.	80.	0.98	5.2	58.	64 2
	248.	99.	0.79	5.3	76.	64 3
	240.	88.	0.61	4.3	81.	64 4
	248.	119.	0.44	3.8	51.	64 5
	240.	122.	0.32	3.0	39.	64 6
	248.	88.	1.09	4.2	61.	64 7
	248.	66.	1.02	4.3	61.	64 8
	240.	170.	0.22	4.5	59.	64 9
	248.	174.	0.49	5.9	62.	64 10
	240.	142.	0.48	4.3	64.	64 11
	248.	171.	0.58	5.0	81.	64 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1408.	0.64	4.5	63.	1964

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	107.	0.95	5.2	61.	65 1
	224.	119.	0.54	4.8	73.	65 2
	248.	106.	0.71	4.8	66.	65 3
	240.	80.	0.75	4.3	65.	65 4
	248.	146.	0.24	3.5	49.	65 5
	240.	130.	0.51	4.1	68.	65 6
	248.	29.	0.91	3.7	58.	65 7
	248.	58.	1.11	3.9	55.	65 8
	240.	142.	0.66	5.2	76.	65 9
	248.	167.	0.42	5.1	56.	65 10
	240.	141.	0.77	4.9	67.	65 11
	248.	167.	0.24	4.3	61.	65 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1392.	0.65	4.4	62.	1965

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	139.	0.35	5.0	64.	66 1
	224.	96.	0.69	5.5	74.	66 2
	248.	92.	0.60	4.7	53.	66 3
	240.	62.	0.97	4.8	73.	66 4
	248.	76.	0.86	4.2	61.	66 5
	240.	154.	0.34	4.6	63.	66 6
	248.	72.	0.76	3.7	40.	66 7
	248.	72.	0.99	3.9	57.	66 8
	240.	59.	1.02	4.2	52.	66 9
	248.	191.	0.32	4.4	62.	66 10
	240.	149.	0.45	4.8	63.	66 11
	248.	106.	0.44	4.8	65.	66 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1268.	0.65	4.5	60.	1966

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	138.	0.49	5.0	71.	67 1
	224.	90.	0.65	4.5	69.	67 2
	248.	122.	0.63	4.4	62.	67 3
	240.	56.	0.86	4.1	58.	67 4
	248.	55.	1.26	4.3	57.	67 5
	240.	141.	0.55	3.7	44.	67 6
	248.	34.	1.00	4.1	52.	67 7
	248.	95.	0.83	3.6	52.	67 8
	240.	160.	0.32	4.3	43.	67 9
	248.	160.	0.34	4.5	59.	67 10
	240.	103.	1.23	5.0	53.	67 11
	248.	78.	0.87	4.6	71.	67 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1232.	0.75	4.3	58.	1967

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	151.	0.43	4.6	60.	68 1
	232.	97.	0.62	5.1	51.	68 2
	248.	87.	0.81	4.8	58.	68 3
	240.	59.	0.89	4.1	56.	68 4
	248.	63.	1.00	3.8	52.	68 5
	240.	27.	0.86	4.9	48.	68 6
	248.	99.	0.70	3.8	49.	68 7
	248.	80.	0.56	4.0	42.	68 8
	240.	116.	0.49	3.6	57.	68 9
	248.	155.	0.26	4.4	47.	68 10
	240.	88.	0.81	5.0	62.	68 11
	248.	83.	0.83	5.0	66.	68 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1105.	0.69	4.4	54.	1968

THIRTEEN YEAR SUMMARY

GULF OF MEXICO STATION = 2 PB (PRE-BREAKING)

WATER DEPTH = 12.1 (FT)

SHORELINE ANGLE = 98.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

TOTAL NUMBER OF CALM CONDITIONS = 16509.

MEAN SIGNIFICANT HEIGHT = 0.67 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 59.6 DEGREES RELATIVE TO SHORELINE ORIENTATION

D E F I N I T I O N S

TSUM = TOTAL NUMBER OF OBSERVATIONS

CALM = NUMBER OF CALM WAVE CONDITIONS

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

MONTHLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	64.	0.94	5.6	62.	56 1
	232.	58.	1.08	4.7	75.	56 2
	248.	69.	0.91	4.5	72.	56 3
	240.	54.	1.16	4.8	65.	56 4
	248.	139.	0.31	3.6	56.	56 5
	240.	60.	0.78	3.7	40.	56 6
	248.	39.	1.17	3.9	48.	56 7
	248.	16.	1.09	4.5	55.	56 8
	240.	157.	0.38	4.8	58.	56 9
	248.	167.	0.41	4.4	68.	56 10
	240.	95.	0.54	4.7	55.	56 11
	248.	89.	0.62	4.8	63.	56 12
YEARLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1007.	0.78	4.5	59.	1956

MONTHLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	83.	0.97	4.6	68.	57 1
	224.	102.	0.91	4.7	67.	57 2
	248.	64.	1.01	4.9	65.	57 3
	240.	146.	0.43	5.0	81.	57 4
	248.	128.	0.69	4.2	78.	57 5
	240.	110.	0.77	4.5	77.	57 6
	248.	0.	1.19	4.7	57.	57 7
	248.	73.	1.02	4.7	46.	57 8
	240.	100.	0.85	4.7	80.	57 9
	248.	137.	0.36	4.4	58.	57 10
	240.	83.	0.70	4.5	64.	57 11
	248.	110.	0.52	5.1	67.	57 12
YEARLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1136.	0.79	4.7	66.	1957

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	93.	0.95	5.7	63.	58 1
	224.	53.	1.46	5.5	67.	58 2
	248.	63.	0.86	4.8	64.	58 3
	240.	48.	0.87	4.5	71.	58 4
	248.	147.	0.30	4.0	68.	58 5
	240.	108.	0.92	3.8	62.	58 6
	248.	99.	0.53	3.5	63.	58 7
	248.	51.	0.90	3.9	47.	58 8
	240.	154.	0.32	4.0	67.	58 9
	248.	185.	0.15	4.2	47.	58 10
	240.	139.	0.38	4.5	66.	58 11
	248.	150.	0.56	5.0	53.	58 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1290.	0.68	4.5	62.	1958

A-38

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	145.	0.46	4.6	63.	59 1
	224.	123.	0.74	4.6	74.	59 2
	248.	93.	0.77	4.7	65.	59 3
	240.	75.	0.74	4.4	68.	59 4
	248.	109.	0.51	4.6	72.	59 5
	240.	54.	0.77	4.1	65.	59 6
	248.	75.	0.72	4.0	68.	59 7
	248.	129.	0.78	4.5	53.	59 8
	240.	128.	0.81	5.1	68.	59 9
	248.	95.	0.67	4.7	71.	59 10
	240.	162.	0.27	5.1	69.	59 11
	248.	118.	0.48	5.2	65.	59 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1306.	0.64	4.6	67.	1959

MONTHLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	62.	0.73	4.8	66.	60 1
	252.	91.	1.22	5.7	66.	60 2
	248.	99.	0.70	4.9	66.	60 3
	240.	134.	0.49	4.5	56.	60 4
	248.	90.	0.46	3.5	50.	60 5
	240.	114.	0.41	3.9	61.	60 6
	248.	16.	0.96	4.1	61.	60 7
	248.	125.	0.64	4.0	62.	60 8
	240.	156.	0.48	5.0	71.	60 9
	248.	166.	0.38	4.7	72.	60 10
	240.	176.	0.14	4.5	58.	60 11
	248.	174.	0.25	5.0	65.	60 12
YEARLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1403.	0.57	4.5	62.	1960

MONTHLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	109.	0.68	5.3	57.	61 1
	224.	62.	0.80	4.7	67.	61 2
	248.	63.	0.71	4.4	70.	61 3
	240.	62.	0.88	4.9	65.	61 4
	248.	93.	0.47	3.8	60.	61 5
	240.	114.	0.40	4.2	67.	61 6
	248.	134.	0.29	3.0	52.	61 7
	248.	132.	0.56	3.9	60.	61 8
	240.	158.	1.02	6.5	75.	61 9
	248.	211.	0.05	5.5	53.	61 10
	240.	110.	0.48	4.5	65.	61 11
	248.	104.	0.66	4.9	69.	61 12
YEARLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1352.	0.58	4.5	64.	1961

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	96.	0.76	4.8	61.	62 1
	224.	44.	1.00	4.7	66.	62 2
	248.	104.	0.63	5.1	73.	62 3
	240.	75.	0.67	4.2	63.	62 4
	248.	104.	0.43	3.7	37.	62 5
	240.	124.	0.38	3.8	63.	62 6
	248.	23.	0.95	4.0	49.	62 7
	248.	106.	0.63	4.3	45.	62 8
	240.	160.	0.37	3.9	70.	62 9
	248.	166.	0.46	4.4	64.	62 10
	240.	129.	0.62	5.4	62.	62 11
	248.	125.	0.50	4.4	55.	62 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1256.	0.62	4.4	58.	1962

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	133.	0.62	4.6	68.	63 1
	224.	95.	0.67	5.0	65.	63 2
	248.	76.	0.74	4.5	72.	63 3
	240.	68.	0.94	4.3	64.	63 4
	248.	109.	0.57	3.5	41.	63 5
	240.	87.	1.04	3.9	62.	63 6
	248.	66.	0.91	4.1	50.	63 7
	248.	53.	0.73	4.3	45.	63 8
	240.	200.	0.18	4.4	50.	63 9
	248.	217.	0.05	5.1	48.	63 10
	240.	122.	0.42	4.9	66.	63 11
	248.	128.	0.50	4.7	59.	63 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1354.	0.61	4.4	58.	1963

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	89.	0.71	4.9	66.	64 1
	232.	80.	0.99	5.2	61.	64 2
	248.	99.	0.79	5.3	77.	64 3
	240.	88.	0.58	4.3	81.	64 4
	248.	119.	0.42	3.8	52.	64 5
	240.	122.	0.30	3.0	41.	64 6
	248.	88.	1.14	4.2	62.	64 7
	248.	66.	1.03	4.3	63.	64 8
	240.	170.	0.21	4.5	61.	64 9
	248.	174.	0.50	5.9	65.	64 10
	240.	142.	0.47	4.3	66.	64 11
	248.	171.	0.59	5.0	82.	64 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1408.	0.65	4.5	65.	1964

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	107.	0.98	5.2	63.	65 1
	224.	119.	0.52	4.8	74.	65 2
	248.	106.	0.69	4.8	68.	65 3
	240.	80.	0.73	4.3	67.	65 4
	248.	146.	0.23	3.5	51.	65 5
	240.	130.	0.49	4.1	69.	65 6
	248.	29.	0.91	3.7	59.	65 7
	248.	58.	1.14	3.9	56.	65 8
	240.	142.	0.67	5.2	78.	65 9
	248.	167.	0.42	5.1	59.	65 10
	240.	141.	0.82	4.9	69.	65 11
	248.	167.	0.23	4.3	63.	65 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1392.	0.65	4.4	64.	1965

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	139.	0.34	5.0	66.	66 1
	224.	96.	0.69	5.5	76.	66 2
	248.	92.	0.58	4.7	55.	66 3
	240.	62.	0.97	4.8	74.	66 4
	248.	76.	0.89	4.2	63.	66 5
	240.	154.	0.35	4.6	65.	66 6
	248.	72.	0.74	3.7	43.	66 7
	248.	72.	1.01	3.9	59.	66 8
	240.	59.	0.99	4.2	54.	66 9
	248.	191.	0.33	4.4	64.	66 10
	240.	149.	0.45	4.8	65.	66 11
	248.	106.	0.42	4.8	67.	66 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1268.	0.64	4.5	62.	1966

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	138.	0.47	5.0	73.	67 1
	224.	90.	0.63	4.5	71.	67 2
	248.	122.	0.61	4.4	64.	67 3
	240.	56.	0.84	4.1	60.	67 4
	248.	55.	1.29	4.3	59.	67 5
	240.	141.	0.55	3.7	46.	67 6
	248.	34.	1.00	4.1	54.	67 7
	248.	95.	0.82	3.6	53.	67 8
	240.	160.	0.31	4.3	46.	67 9
	248.	160.	0.33	4.5	61.	67 10
	240.	103.	1.31	5.0	56.	67 11
	248.	78.	0.89	4.6	72.	67 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1232.	0.75	4.3	60.	1967

MONTHLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	151.	0.43	4.6	63.	68 1
	237.	97.	0.61	5.1	55.	68 2
	243.	87.	0.79	4.8	61.	68 3
	240.	59.	0.87	4.1	58.	68 4
	248.	63.	0.99	3.8	54.	68 5
	240.	27.	0.87	4.9	51.	68 6
	248.	99.	0.71	3.8	51.	68 7
	248.	80.	0.53	4.0	44.	68 8
	240.	116.	0.47	3.6	59.	68 9
	248.	155.	0.25	4.4	49.	68 10
	240.	88.	0.81	5.0	64.	68 11
	248.	83.	0.83	5.0	68.	68 12
YEARLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1105.	0.68	4.4	56.	1968

THIRTEEN YEAR SUMMARY

GULF OF MEXICO STATION = 3 PB (PRE-BREAKING)

WATER DEPTH = 10.5 (FT)

SHORELINE ANGLE = 98.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

TOTAL NUMBER OF CALM CONDITIONS = 16509.

MEAN SIGNIFICANT HEIGHT = 0.66 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 61.6 DEGREES RELATIVE TO SHORELINE ORIENTATION

D E F I N I T I O N S

TSUM = TOTAL NUMBER OF OBSERVATIONS

CALM = NUMBER OF CALM WAVE CONDITIONS

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	64.	0.94	5.6	74.	56 1
	232.	58.	1.07	4.7	86.	56 2
	248.	69.	0.90	4.5	83.	56 3
	240.	54.	1.15	4.8	76.	56 4
	248.	139.	0.29	3.6	68.	56 5
	240.	60.	0.71	3.7	52.	56 6
	248.	39.	1.14	3.9	59.	56 7
	248.	16.	1.07	4.5	66.	56 8
	240.	157.	0.37	4.8	70.	56 9
	248.	167.	0.41	4.4	78.	56 10
	240.	95.	0.51	4.7	67.	56 11
	248.	89.	0.59	4.8	74.	56 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1007.	0.76	4.5	71.	1956

A-46

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	83.	0.96	4.6	79.	57 1
	224.	102.	0.91	4.7	78.	57 2
	248.	64.	1.00	4.9	77.	57 3
	240.	146.	0.43	5.0	91.	57 4
	248.	128.	0.70	4.2	88.	57 5
	240.	110.	0.76	4.5	88.	57 6
	248.	0.	1.18	4.7	69.	57 7
	248.	73.	0.99	4.7	58.	57 8
	240.	100.	0.84	4.7	90.	57 9
	248.	137.	0.34	4.4	69.	57 10
	240.	83.	0.67	4.5	75.	57 11
	248.	110.	0.50	5.1	78.	57 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1136.	0.77	4.7	77.	1957

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	93.	0.95	5.7	74.	58 1
	224.	53.	1.48	5.5	78.	58 2
	248.	63.	0.83	4.8	75.	58 3
	240.	48.	0.84	4.5	82.	58 4
	248.	147.	0.29	4.0	78.	58 5
	240.	108.	0.93	3.8	73.	58 6
	248.	99.	0.51	3.5	73.	58 7
	248.	51.	0.86	3.9	59.	58 8
	240.	154.	0.30	4.0	78.	58 9
	248.	185.	0.13	4.2	59.	58 10
	240.	139.	0.36	4.5	77.	58 11
	248.	150.	0.57	5.0	65.	58 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1290.	0.66	4.5	73.	1958

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	145.	0.44	4.6	74.	59 1
	224.	123.	0.74	4.6	85.	59 2
	248.	93.	0.74	4.7	76.	59 3
	240.	75.	0.72	4.4	79.	59 4
	248.	109.	0.49	4.6	83.	59 5
	240.	54.	0.75	4.1	76.	59 6
	248.	75.	0.73	4.0	79.	59 7
	248.	129.	0.77	4.5	64.	59 8
	240.	128.	0.82	5.1	79.	59 9
	248.	95.	0.66	4.7	82.	59 10
	240.	162.	0.27	5.1	80.	59 11
	248.	118.	0.47	5.2	76.	59 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1306.	0.63	4.6	78.	1959

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	62.	0.72	4.8	76.	60 1
	232.	91.	1.23	5.7	77.	60 2
	248.	99.	0.68	4.9	77.	60 3
	240.	134.	0.45	4.5	68.	60 4
	248.	90.	0.42	3.5	61.	60 5
	240.	114.	0.40	3.9	72.	60 6
	248.	16.	0.95	4.1	72.	60 7
	248.	125.	0.63	4.0	73.	60 8
	240.	156.	0.47	5.0	82.	60 9
	248.	166.	0.37	4.7	83.	60 10
	240.	176.	0.13	4.5	69.	60 11
	248.	174.	0.23	5.0	76.	60 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1403.	0.56	4.5	73.	1960

A-48

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	109.	0.66	5.3	68.	61 1
	224.	62.	0.76	4.7	77.	61 2
	248.	63.	0.67	4.4	81.	61 3
	240.	62.	0.85	4.9	76.	61 4
	248.	93.	0.45	3.8	71.	61 5
	240.	114.	0.37	4.2	78.	61 6
	248.	134.	0.27	3.0	63.	61 7
	248.	132.	0.55	3.9	71.	61 8
	240.	158.	1.06	6.5	86.	61 9
	248.	211.	0.05	5.5	65.	61 10
	240.	110.	0.45	4.5	76.	61 11
	248.	104.	0.64	4.9	80.	61 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1352.	0.56	4.5	75.	1961

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	96.	0.74	4.8	72.	62 1
	224.	44.	0.98	4.7	77.	62 2
	248.	104.	0.61	5.1	83.	62 3
	240.	75.	0.64	4.2	74.	62 4
	248.	104.	0.39	3.7	50.	62 5
	240.	124.	0.37	3.8	75.	62 6
	248.	23.	0.89	4.0	61.	62 7
	248.	106.	0.60	4.3	57.	62 8
	240.	160.	0.37	3.9	80.	62 9
	248.	166.	0.47	4.4	75.	62 10
	240.	129.	0.61	5.4	73.	62 11
	248.	125.	0.47	4.4	66.	62 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1256.	0.59	4.4	69.	1962

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	133.	0.61	4.6	79.	63 1
	224.	95.	0.65	5.0	76.	63 2
	248.	76.	0.72	4.5	82.	63 3
	240.	68.	0.92	4.3	75.	63 4
	248.	109.	0.53	3.5	53.	63 5
	240.	87.	1.05	3.9	73.	63 6
	248.	66.	0.88	4.1	62.	63 7
	248.	53.	0.69	4.3	58.	63 8
	240.	200.	0.17	4.4	63.	63 9
	248.	217.	0.05	5.1	60.	63 10
	240.	122.	0.40	4.9	77.	63 11
	248.	128.	0.47	4.7	70.	63 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1354.	0.59	4.4	69.	1963

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	89.	0.69	4.9	77.	64 1
	232.	80.	0.98	5.2	72.	64 2
	248.	99.	0.78	5.3	88.	64 3
	240.	88.	0.56	4.3	91.	64 4
	248.	119.	0.39	3.8	64.	64 5
	240.	122.	0.28	3.0	53.	64 6
	248.	88.	1.16	4.2	73.	64 7
	248.	66.	1.02	4.3	74.	64 8
	240.	170.	0.19	4.5	72.	64 9
	248.	174.	0.51	5.9	76.	64 10
	240.	142.	0.46	4.3	77.	64 11
	248.	171.	0.60	5.0	93.	64 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1408.	0.64	4.5	76.	1964

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	107.	1.00	5.2	75.	65 1
	224.	119.	0.50	4.8	85.	65 2
	248.	106.	0.66	4.8	79.	65 3
	240.	80.	0.70	1.3	77.	65 4
	248.	146.	0.21	3.5	63.	65 5
	240.	130.	0.47	4.1	79.	65 6
	248.	29.	0.89	3.7	70.	65 7
	248.	58.	1.14	3.9	67.	65 8
	240.	142.	0.66	5.2	88.	65 9
	248.	167.	0.41	5.1	70.	65 10
	240.	141.	0.84	4.9	80.	65 11
	248.	167.	0.21	4.3	74.	65 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1392.	0.64	4.4	75.	1965

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	139.	0.33	5.0	77.	66 1
	224.	96.	0.68	5.5	87.	66 2
	248.	92.	0.54	4.7	67.	66 3
	240.	62.	0.96	4.8	85.	66 4
	248.	76.	0.90	4.2	74.	66 5
	240.	154.	0.34	4.6	77.	66 6
	248.	72.	0.70	3.7	55.	66 7
	248.	72.	1.01	3.9	71.	66 8
	240.	59.	0.94	4.2	65.	66 9
	248.	191.	0.33	4.4	75.	66 10
	240.	149.	0.43	4.8	76.	66 11
	248.	106.	0.39	4.8	78.	66 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1268.	0.63	4.5	73.	1966

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	138.	0.45	5.0	83.	67 1
	224.	90.	0.61	4.5	81.	67 2
	248.	122.	0.59	4.4	75.	67 3
	240.	56.	0.80	4.1	71.	67 4
	248.	55.	1.29	4.3	71.	67 5
	240.	141.	0.53	3.7	57.	67 6
	248.	34.	0.99	4.1	65.	67 7
	248.	95.	0.80	3.6	64.	67 8
	240.	160.	0.29	4.3	59.	67 9
	248.	160.	0.30	4.5	72.	67 10
	240.	103.	1.36	5.0	68.	67 11
	248.	78.	0.89	4.6	83.	67 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1232.	0.74	4.3	71.	1967

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	151.	0.42	4.6	74.	68 1
	232.	97.	0.58	5.1	66.	68 2
	248.	87.	0.76	4.8	72.	68 3
	240.	59.	0.83	4.1	69.	68 4
	248.	63.	0.96	3.8	65.	68 5
	240.	27.	0.85	4.9	62.	68 6
	248.	99.	0.69	3.8	62.	68 7
	248.	80.	0.49	4.0	56.	68 8
	240.	116.	0.45	3.6	70.	68 9
	248.	155.	0.22	4.4	61.	68 10
	240.	88.	0.79	5.0	76.	68 11
	248.	83.	0.82	5.0	79.	68 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1105.	0.66	4.4	68.	1968

THIRTEEN YEAR SUMMARY

GULF OF MEXICO STATION = 4 PB (PRE-BREAKING)

WATER DEPTH = 9.8 (FT)

SHORELINE ANGLE = 89.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

TOTAL NUMBER OF CALM CONDITIONS = 16509.

MEAN SIGNIFICANT HEIGHT = 0.65 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 72.8 DEGREES RELATIVE TO SHORELINE ORIENTATION

D E F I N I T I O N S

TSUM = TOTAL NUMBER OF OBSERVATIONS

CALM = NUMBER OF CALM WAVE CONDITIONS

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	64.	0.94	5.6	70.	56 1
	232.	58.	1.05	4.7	84.	56 2
	248.	69.	0.90	4.5	81.	56 3
	240.	54.	1.12	4.8	73.	56 4
	248.	139.	0.30	3.6	65.	56 5
	240.	60.	0.74	3.7	49.	56 6
	248.	39.	1.16	3.9	57.	56 7
	248.	16.	1.07	4.5	63.	56 8
	240.	157.	0.36	4.8	66.	56 9
	248.	167.	0.41	4.4	76.	56 10
	240.	95.	0.52	4.7	63.	56 11
	248.	89.	0.60	4.8	71.	56 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1007.	0.76	4.5	68.	1956

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	83.	0.97	4.6	77.	57 1
	224.	102.	0.92	4.7	76.	57 2
	248.	64.	1.01	4.9	74.	57 3
	240.	146.	0.43	5.0	89.	57 4
	248.	128.	0.70	4.2	87.	57 5
	240.	110.	0.74	4.5	86.	57 6
	248.	0.	1.20	4.7	66.	57 7
	248.	73.	1.01	4.7	54.	57 8
	240.	100.	0.80	4.7	89.	57 9
	248.	137.	0.35	4.4	66.	57 10
	240.	83.	0.68	4.5	72.	57 11
	248.	110.	0.50	5.1	74.	57 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1136.	0.78	4.7	74.	1957

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	93.	0.96	5.7	70.	58 1
	224.	53.	1.44	5.5	75.	58 2
	248.	63.	0.83	4.8	72.	58 3
	240.	48.	0.84	4.5	79.	58 4
	248.	147.	0.29	4.0	76.	58 5
	240.	108.	0.95	3.8	71.	58 6
	248.	99.	0.53	3.5	72.	58 7
	248.	51.	0.90	3.9	56.	58 8
	240.	154.	0.30	4.0	75.	58 9
	248.	185.	0.14	4.2	55.	58 10
	240.	139.	0.36	4.5	74.	58 11
	248.	150.	0.57	5.0	61.	58 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1290.	0.67	4.5	70.	1958

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	145.	0.44	4.6	71.	59 1
	224.	123.	0.75	4.6	83.	59 2
	248.	93.	0.74	4.7	73.	59 3
	240.	75.	0.73	4.4	76.	59 4
	248.	109.	0.49	4.6	81.	59 5
	240.	54.	0.76	4.1	74.	59 6
	248.	75.	0.74	4.0	77.	59 7
	248.	129.	0.79	4.5	61.	59 8
	240.	128.	0.81	5.1	77.	59 9
	248.	95.	0.66	4.7	80.	59 10
	240.	162.	0.27	5.1	77.	59 11
	248.	118.	0.47	5.2	72.	59 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1306.	0.64	4.6	75.	1959

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	62.	0.73	4.8	73.	60 1
	232.	91.	1.20	5.7	74.	60 2
	248.	99.	0.68	4.9	74.	60 3
	240.	134.	0.46	4.5	64.	60 4
	248.	90.	0.43	3.5	58.	60 5
	240.	114.	0.41	3.9	69.	60 6
	248.	16.	0.96	4.1	70.	60 7
	248.	125.	0.64	4.0	71.	60 8
	240.	156.	0.46	5.0	80.	60 9
	248.	166.	0.36	4.7	81.	60 10
	176.	176.	0.13	4.5	65.	60 11
	248.	174.	0.23	5.0	72.	60 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1403.	0.56	4.5	71.	1960

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	109.	0.69	5.3	64.	61 1
	224.	62.	0.76	4.7	75.	61 2
	248.	63.	0.67	4.4	78.	61 3
	240.	62.	0.86	4.9	72.	61 4
	248.	93.	0.46	3.8	69.	61 5
	240.	114.	0.37	4.2	76.	61 6
	248.	134.	0.28	3.0	61.	61 7
	248.	132.	0.56	3.9	69.	61 8
	240.	158.	1.03	6.5	85.	61 9
	248.	211.	0.05	5.5	59.	61 10
	240.	110.	0.45	4.5	73.	61 11
	248.	104.	0.63	4.9	77.	61 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1352.	0.56	4.5	72.	1961

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	96.	0.75	4.8	69.	62 1
	224.	44.	0.99	4.7	74.	62 2
	248.	104.	0.59	5.1	80.	62 3
	240.	75.	0.65	4.2	71.	62 4
	248.	104.	0.40	3.7	47.	62 5
	240.	124.	0.37	3.8	73.	62 6
	248.	23.	0.92	4.0	57.	62 7
	248.	106.	0.62	4.3	54.	62 8
	240.	160.	0.37	3.9	79.	62 9
	248.	166.	0.48	4.4	72.	62 10
	240.	129.	0.62	5.4	70.	62 11
	248.	125.	0.48	4.4	62.	62 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1256.	0.60	4.4	66.	1962

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	133.	0.60	4.6	77.	63 1
	224.	95.	0.65	5.0	72.	63 2
	248.	76.	0.72	4.5	80.	63 3
	240.	68.	0.94	4.3	72.	63 4
	248.	109.	0.56	3.5	50.	63 5
	240.	87.	1.05	3.3	72.	63 6
	248.	66.	0.90	4.1	59.	63 7
	248.	53.	0.71	4.3	54.	63 8
	240.	200.	0.17	4.4	60.	63 9
	248.	217.	0.05	5.1	55.	63 10
	240.	122.	0.40	4.9	73.	63 11
	248.	128.	0.48	4.7	66.	63 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1354.	0.60	4.4	67.	1963

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	89.	0.69	4.9	74.	64 1
	232.	80.	0.98	5.2	68.	64 2
	248.	99.	0.76	5.3	86.	64 3
	240.	88.	0.56	4.3	90.	64 4
	248.	119.	0.40	3.8	61.	64 5
	240.	122.	0.29	3.0	50.	64 6
	248.	88.	1.17	4.2	72.	64 7
	248.	66.	1.02	4.3	72.	64 8
	240.	170.	0.19	4.5	69.	64 9
	248.	174.	0.49	5.9	72.	64 10
	240.	142.	0.46	4.3	75.	64 11
	248.	171.	0.57	5.0	92.	64 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1408.	0.63	4.5	73.	1964

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	107.	0.99	5.2	72.	65 1
	224.	119.	0.51	4.8	82.	65 2
	248.	106.	0.67	4.8	76.	65 3
	240.	80.	0.70	4.3	75.	65 4
	248.	146.	0.22	3.5	61.	65 5
	240.	130.	0.47	4.1	78.	65 6
	248.	29.	0.92	3.7	68.	65 7
	248.	58.	1.15	3.9	66.	65 8
	240.	142.	0.64	5.2	87.	65 9
	248.	167.	0.41	5.1	66.	65 10
	240.	141.	0.82	4.9	78.	65 11
	248.	167.	0.21	4.3	71.	65 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1392.	0.64	4.4	73.	1965

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	139.	0.32	5.0	74.	66 1
	224.	96.	0.65	5.5	84.	66 2
	248.	92.	0.55	4.7	63.	66 3
	240.	62.	0.96	4.8	82.	66 4
	248.	76.	0.91	4.2	71.	66 5
	240.	154.	0.34	4.6	74.	66 6
	248.	72.	0.73	3.7	52.	66 7
	248.	72.	1.03	3.9	68.	66 8
	240.	59.	0.96	4.2	62.	66 9
	248.	191.	0.33	4.4	73.	66 10
	240.	149.	0.43	4.8	73.	66 11
	248.	106.	0.39	4.8	74.	66 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1268.	0.63	4.5	70.	1966

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	138.	0.44	5.0	80.	67 1
	224.	90.	0.61	4.5	79.	67 2
	248.	122.	0.59	4.4	72.	67 3
	240.	56.	0.81	4.1	69.	67 4
	248.	55.	1.30	4.3	68.	67 5
	240.	141.	0.55	3.7	55.	67 6
	248.	34.	1.02	4.1	62.	67 7
	248.	95.	0.83	3.6	63.	67 8
	240.	160.	0.30	4.3	56.	67 9
	248.	160.	0.31	4.5	69.	67 10
	240.	103.	1.38	5.0	64.	67 11
	248.	78.	0.87	4.6	81.	67 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1232.	0.75	4.3	69.	1967

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	151.	0.42	4.6	71.	68 1
	232.	97.	0.58	5.1	62.	68 2
	248.	87.	0.75	4.8	69.	68 3
	240.	59.	0.85	4.1	66.	68 4
	248.	63.	0.99	3.8	63.	68 5
	240.	27.	0.88	4.9	58.	68 6
	248.	99.	0.72	3.8	60.	68 7
	248.	80.	0.51	4.0	53.	68 8
	240.	116.	0.47	3.6	68.	68 9
	248.	155.	0.23	4.4	57.	68 10
	240.	88.	0.78	5.0	72.	68 11
	248.	83.	0.81	5.0	76.	68 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1105.	0.66	4.4	64.	1968

THIRTEEN YEAR SUMMARY

GULF OF MEXICO STATION = 5 PB (PRE-BREAKING)

WATER DEPTH = 11.5 (FT)

SHORELINE ANGLE = 89.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

TOTAL NUMBER OF CALM CONDITIONS = 16509.

MEAN SIGNIFICANT HEIGHT = 0.65 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 70.0 DEGREES RELATIVE TO SHORELINE ORIENTATION

D E F I N I T I O N S

TSUM = TOTAL NUMBER OF OBSERVATIONS

CALM = NUMBER OF CALM WAVE CONDITIONS

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVP[R	AVANG	DATE
	248.	64.	0.93	5.6	67.	56 1
	232.	58.	1.03	4.7	82.	56 2
	248.	69.	0.89	4.5	79.	56 3
	240.	54.	1.09	4.8	71.	56 4
	248.	139.	0.31	3.6	64.	56 5
	240.	60.	0.77	3.7	48.	56 6
	248.	39.	1.17	3.9	55.	56 7
	248.	16.	1.07	4.5	62.	56 8
	240.	157.	0.35	4.8	64.	56 9
	248.	167.	0.42	4.4	75.	56 10
	240.	95.	0.53	4.7	61.	56 11
	248.	89.	0.61	4.8	69.	56 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1007.	0.76	4.5	66.	1956

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	83.	0.98	4.6	75.	57 1
	224.	102.	0.92	4.7	74.	57 2
	248.	64.	1.02	4.9	72.	57 3
	240.	146.	0.43	5.0	88.	57 4
	248.	128.	0.69	4.2	86.	57 5
	240.	110.	0.72	4.5	86.	57 6
	248.	0.	1.22	4.7	65.	57 7
	248.	73.	1.03	4.7	53.	57 8
	240.	100.	0.78	4.7	88.	57 9
	248.	137.	0.35	4.4	64.	57 10
	240.	83.	0.68	4.5	70.	57 11
	248.	110.	0.49	5.1	72.	57 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1136.	0.78	4.7	73.	1957

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	93.	0.97	5.7	67.	58 1
	224.	53.	1.41	5.5	73.	58 2
	248.	63.	0.83	4.8	70.	58 3
	240.	48.	0.84	4.5	78.	58 4
	248.	147.	0.29	4.0	74.	58 5
	240.	108.	0.96	3.8	71.	58 6
	248.	99.	0.54	3.5	71.	58 7
	248.	51.	0.92	3.9	54.	58 8
	240.	154.	0.31	4.0	74.	58 9
	248.	185.	0.14	4.2	53.	58 10
	240.	139.	0.36	4.5	72.	58 11
	248.	150.	0.57	5.0	59.	58 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1290.	0.67	4.5	69.	1958

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	145.	0.43	4.6	70.	59 1
	224.	123.	0.76	4.6	82.	59 2
	248.	93.	0.74	4.7	71.	59 3
	240.	75.	0.74	4.4	75.	59 4
	248.	109.	0.49	4.6	80.	59 5
	240.	54.	0.76	4.1	73.	59 6
	248.	75.	0.75	4.0	77.	59 7
	248.	129.	0.80	4.5	59.	59 8
	240.	128.	0.80	5.1	75.	59 9
	248.	95.	0.66	4.7	78.	59 10
	240.	162.	0.27	5.1	74.	59 11
	248.	118.	0.47	5.2	69.	59 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1306.	0.64	4.6	74.	1959

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	62.	0.74	4.8	71.	60 1
	232.	91.	1.16	5.7	72.	60 2
	248.	99.	0.67	4.9	72.	60 3
	240.	134.	0.48	4.5	62.	60 4
	248.	90.	0.44	3.5	57.	60 5
	240.	114.	0.42	3.9	67.	60 6
	248.	16.	0.96	4.1	70.	60 7
	248.	125.	0.63	4.0	70.	60 8
	240.	156.	0.45	5.0	79.	60 9
	248.	166.	0.35	4.7	80.	60 10
	240.	176.	0.13	4.5	62.	60 11
	248.	174.	0.23	5.0	70.	60 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1403.	0.55	4.5	69.	1960

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	109.	0.73	5.3	61.	61 1
	224.	62.	0.77	4.7	73.	61 2
	248.	63.	0.67	4.4	77.	61 3
	240.	62.	0.87	4.9	70.	61 4
	248.	93.	0.46	3.8	68.	61 5
	240.	114.	0.37	4.2	75.	61 6
	248.	134.	0.28	3.0	60.	61 7
	248.	132.	0.56	3.9	68.	61 8
	240.	158.	0.99	6.5	84.	61 9
	248.	211.	0.05	5.5	55.	61 10
	240.	110.	0.45	4.5	71.	61 11
	248.	104.	0.63	4.9	75.	61 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1352.	0.57	4.5	71.	1961

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	96.	0.76	4.8	67.	62 1
	224.	44.	0.99	4.7	72.	62 2
	248.	104.	0.58	5.1	78.	62 3
	240.	75.	0.65	4.2	69.	62 4
	248.	104.	0.42	3.7	45.	62 5
	240.	124.	0.37	3.8	72.	62 6
	248.	23.	0.94	4.0	56.	62 7
	248.	106.	0.63	4.3	52.	62 8
	240.	160.	0.37	3.9	79.	62 9
	248.	166.	0.49	4.4	71.	62 10
	240.	129.	0.63	5.4	68.	62 11
	248.	125.	0.48	4.4	60.	62 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1256.	0.61	4.4	65.	1962

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	133.	0.59	4.6	75.	63 1
	224.	95.	0.64	5.0	70.	63 2
	248.	76.	0.72	4.5	79.	63 3
	240.	68.	0.95	4.3	71.	63 4
	248.	109.	0.58	3.5	49.	63 5
	240.	87.	1.04	3.9	71.	63 6
	248.	66.	0.92	4.1	58.	63 7
	248.	53.	0.73	4.3	52.	63 8
	240.	200.	0.17	4.4	58.	63 9
	248.	217.	0.05	5.1	52.	63 10
	240.	122.	0.40	4.9	71.	63 11
	248.	128.	0.48	4.7	64.	63 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1354.	0.60	4.4	65.	1963

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	89.	0.69	4.9	72.	64 1
	232.	80.	0.97	5.2	66.	64 2
	248.	99.	0.75	5.3	84.	64 3
	240.	88.	0.55	4.3	89.	64 4
	248.	119.	0.41	3.8	59.	64 5
	240.	122.	0.30	3.0	49.	64 6
	248.	88.	1.16	4.2	71.	64 7
	248.	66.	1.01	4.3	71.	64 8
	240.	170.	0.19	4.5	66.	64 9
	248.	174.	0.47	5.9	70.	64 10
	240.	142.	0.45	4.3	74.	64 11
	248.	171.	0.54	5.0	91.	64 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1408.	0.63	4.5	72.	1964

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	107.	0.98	5.2	70.	65 1
	224.	119.	0.51	4.8	81.	65 2
	248.	106.	0.69	4.8	74.	65 3
	240.	80.	0.70	4.3	74.	65 4
	248.	146.	0.22	3.5	59.	65 5
	240.	130.	0.47	4.1	77.	65 6
	248.	29.	0.93	3.7	67.	65 7
	248.	58.	1.15	3.9	65.	65 8
	240.	142.	0.61	5.2	86.	65 9
	248.	167.	0.41	5.1	64.	65 10
	240.	141.	0.80	4.9	77.	65 11
	248.	167.	0.21	4.3	70.	65 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1392.	0.64	4.4	71.	1965

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	139.	0.32	5.0	71.	66 1
	224.	96.	0.62	5.5	83.	66 2
	248.	92.	0.56	4.7	61.	66 3
	240.	62.	0.97	4.8	81.	66 4
	248.	76.	0.92	4.2	71.	66 5
	240.	154.	0.34	4.6	73.	66 6
	248.	72.	0.75	3.7	50.	66 7
	248.	72.	1.04	3.9	67.	66 8
	240.	59.	0.97	4.2	61.	66 9
	248.	191.	0.33	4.4	71.	66 10
	240.	149.	0.43	4.8	71.	66 11
	248.	106.	0.39	4.8	72.	66 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1268.	0.64	4.5	69.	1966

MONTHLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	138.	0.43	5.0	79.	67 1
	224.	90.	0.60	4.5	78.	67 2
	248.	122.	0.59	4.4	71.	67 3
	240.	56.	0.82	4.1	67.	67 4
	248.	55.	1.30	4.3	67.	67 5
	240.	141.	0.56	3.7	54.	67 6
	248.	34.	1.04	4.1	61.	67 7
	248.	95.	0.84	3.6	62.	67 8
	240.	160.	0.30	4.3	54.	67 9
	248.	160.	0.31	4.5	67.	67 10
	240.	103.	1.38	5.0	63.	67 11
	248.	78.	0.85	4.6	80.	67 12
YEARLY SUMMARY	TSUM	CALM	H MEAN	AVPER	AVANG	DATE
	2920.	1232.	0.75	4.3	67.	1967

MONTHLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	248.	151.	0.42	4.6	69.	68 1
	232.	97.	0.58	5.1	59.	68 2
	248.	87.	0.75	4.8	67.	68 3
	240.	59.	0.87	4.1	65.	68 4
	248.	63.	1.01	3.8	62.	68 5
	240.	27.	0.90	4.9	56.	68 6
	248.	99.	0.73	3.8	59.	68 7
	248.	80.	0.52	4.0	51.	68 8
	240.	116.	0.47	3.6	67.	68 9
	248.	155.	0.23	4.4	54.	68 10
	240.	88.	0.77	5.0	70.	68 11
	248.	83.	0.80	5.0	74.	68 12
YEARLY SUMMARY	T SUM	CALM	H MEAN	AVPER	AVANG	DATE
	2928.	1105.	0.67	4.4	63.	1968

THIRTEEN YEAR SUMMARY

GULF OF MEXICO STATION = 6 PB (PRE-BREAKING)

WATER DEPTH = 13.1 (FT)

SHORELINE ANGLE = 89.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

TOTAL NUMBER OF CALM CONDITIONS = 16509.

MEAN SIGNIFICANT HEIGHT = 0.65 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 68.6 DEGREES RELATIVE TO SHORELINE ORIENTATION

D E F I N I T I O N S

TSUM = NUMBER OF OBSERVATIONS

PLS = MEAN ENERGY FLUX (FT LB/SEC/LIN FT)

Q NET = NET LONGSHORE TRANSPORT (CU YD/TIME)

Q GROSS = GROSS LONGSHORE TRANSPORT NO DIRECTION

Q RIGHT = NET TRANSPORT RATE TO WEST OR SOUTH

Q LEFT = NET TRANSPORT RATE TO EAST OR NORTH

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

STATION = 1 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-39.	-0.25E 05	0.25E 05	0.	0.25E 05	0.90	5.6	77.	56 1
232.	-29.	-0.17E 05	0.17E 05	0.34E 01	0.17E 05	1.06	4.7	83.	56 2
248.	-17.	-0.11E 05	0.11E 05	0.13E 01	0.11E 05	0.91	4.5	81.	56 3
240.	-46.	-0.28E 05	0.28E 05	0.43E 00	0.28E 05	1.04	4.8	77.	56 4
248.	-2.	-0.10E 04	0.10E 04	0.	0.10E 04	0.25	3.6	73.	56 5
240.	-8.	-0.51E 04	0.51E 04	0.92E-02	0.51E 04	0.57	3.7	61.	56 6
248.	-26.	-0.17E 05	0.17E 05	0.	0.17E 05	0.88	3.9	69.	56 7
248.	-23.	-0.15E 05	0.15E 05	0.	0.15E 05	0.89	4.5	74.	56 8
240.	-22.	-0.14E 05	0.14E 05	0.68E-01	0.14E 05	0.37	4.8	69.	56 9
248.	-14.	-0.86E 04	0.86E 04	0.42E 00	0.86E 04	0.39	4.4	79.	56 10
240.	-10.	-0.59E 04	0.59E 04	0.19E-01	0.59E 04	0.48	4.7	75.	56 11
248.	-11.	-0.73E 04	0.73E 04	0.85E 00	0.73E 04	0.65	4.8	77.	56 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-20.	-0.15E 06	0.15E 06	0.65E 01	0.15E 06	0.70	4.5	75.	1956

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-27.	-0.17E 05	0.17E 05	0.17E 01	0.17E 05	0.89	4.6	80.	57 1
224.	-35.	-0.20E 05	0.20E 05	0.	0.20E 05	0.84	4.7	78.	57 2
248.	-32.	-0.20E 05	0.20E 05	0.42E 00	0.20E 05	0.95	4.9	78.	57 3
240.	-9.	-0.56E 04	0.56E 04	0.87E 00	0.56E 04	0.48	5.0	85.	57 4
248.	-21.	-0.13E 05	0.13E 05	0.88E 00	0.13E 05	0.62	4.2	83.	57 5
240.	-24.	-0.15E 05	0.15E 05	0.42E 00	0.15E 05	0.76	4.5	82.	57 6
248.	-19.	-0.12E 05	0.12E 05	0.	0.12E 05	1.01	4.7	78.	57 7
248.	-35.	-0.22E 05	0.22E 05	0.30E-01	0.22E 05	0.83	4.7	68.	57 8
240.	-24.	-0.15E 05	0.15E 05	0.21E 01	0.15E 05	0.89	4.7	83.	57 9
248.	-4.	-0.24E 04	0.24E 04	0.12E-01	0.24E 04	0.32	4.4	73.	57 10
240.	-11.	-0.70E 04	0.70E 04	0.69E-02	0.70E 04	0.68	4.5	77.	57 11
248.	-11.	-0.68E 04	0.68E 04	0.16E-01	0.68E 04	0.57	5.1	80.	57 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-21.	-0.16E 06	0.16E 06	0.66E 01	0.16E 06	0.74	4.7	78.	1957

STATION = 1 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-53.	-0.34E 05	0.34E 05	0.87E 00	0.34E 05	0.94	5.7	77.	58 1
224.	-176.	-0.10E 06	0.10E 06	0.44E 00	0.10E 06	1.30	5.5	76.	58 2
248.	-27.	-0.17E 05	0.17E 05	0.13E 01	0.17E 05	0.85	4.8	77.	58 3
240.	-16.	-0.96E 04	0.96E 04	0.30E 01	0.96E 04	0.90	4.5	80.	58 4
248.	-3.	-0.20E 04	0.20E 04	0.21E-01	0.20E 04	0.28	4.0	78.	58 5
240.	-36.	-0.22E 05	0.22E 05	0.13E 01	0.22E 05	0.80	3.8	74.	58 6
248.	-5.	-0.33E 04	0.33E 04	0.	0.33E 04	0.42	3.5	76.	58 7
248.	-20.	-0.13E 05	0.13E 05	0.	0.13E 05	0.68	3.9	68.	58 8
240.	-2.	-0.12E 04	0.12E 04	0.42E 00	0.12E 04	0.33	4.0	76.	58 9
248.	-0.	-0.18E 03	0.18E 03	0.	0.18E 03	0.11	4.2	63.	58 10
240.	-7.	-0.41E 04	0.41E 04	0.45E 00	0.41E 04	0.38	4.5	79.	58 11
248.	-28.	-0.18E 05	0.18E 05	0.28E-01	0.18E 05	0.46	5.0	72.	58 12
YEARLY SUMMARY									
TSUM 2920.	-30.	-0.23E 06	Q GROSS 0.23E 06	Q RIGHT 0.79E 01	Q LEFT 0.23E 06	H MEAN 0.62	AVPER 4.5	AVANG 75.	DATE 1958

A-74

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-10.	-0.65E 04	0.65E 04	0.	0.65E 04	0.47	4.6	73.	59 1
224.	-39.	-0.22E 05	0.22E 05	0.85E 00	0.22E 05	0.67	4.6	82.	59 2
248.	-22.	-0.14E 05	0.14E 05	0.44E 00	0.14E 05	0.76	4.7	77.	59 3
240.	-14.	-0.89E 04	0.89E 04	0.22E 01	0.89E 04	0.70	4.4	78.	59 4
248.	-5.	-0.32E 04	0.32E 04	0.44E 00	0.32E 04	0.50	4.6	83.	59 5
240.	-10.	-0.64E 04	0.64E 04	0.	0.64E 04	0.70	4.1	77.	59 6
248.	-9.	-0.56E 04	0.56E 04	0.	0.56E 04	0.64	4.0	78.	59 7
248.	-31.	-0.20E 05	0.20E 05	0.	0.20E 05	0.69	4.5	72.	59 8
240.	-30.	-0.19E 05	0.19E 05	0.	0.19E 05	0.75	5.1	78.	59 9
248.	-18.	-0.11E 05	0.11E 05	0.88E 00	0.11E 05	0.67	4.7	82.	59 10
240.	-5.	-0.34E 04	0.34E 04	0.19E-01	0.34E 04	0.31	5.1	81.	59 11
248.	-12.	-0.74E 04	0.74E 04	0.	0.74E 04	0.51	5.2	79.	59 12
YEARLY SUMMARY									
TSUM 2920.	-17.	-0.13E 06	Q GROSS 0.13E 06	Q RIGHT 0.48E 01	Q LEFT 0.13E 06	H MEAN 0.61	AVPER 4.6	AVANG 78.	DATE 1959

STATION = 1 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-19.	-0.12E 05	0.12E 05	0.59E-01	0.12E 05	0.72	4.8	75.	60 1
232.	-19.	-0.47E 05	0.47E 05	0.43E 00	0.47E 05	1.10	5.7	79.	60 2
248.	-18.	-0.11E 05	0.11E 05	0.18E-01	0.11E 05	0.70	4.9	80.	60 3
240.	-9.	-0.53E 04	0.53E 04	0.88E 00	0.53E 04	0.44	4.5	76.	60 4
248.	-6.	-0.36E 04	0.36E 04	0.	0.36E 04	0.36	3.5	67.	60 5
240.	-5.	-0.28E 04	0.28E 04	0.	0.28E 04	0.36	3.9	74.	60 6
248.	-14.	-0.91E 04	0.91E 04	0.	0.91E 04	0.79	4.1	75.	60 7
248.	-15.	-0.97E 04	0.97E 04	0.42E 00	0.97E 04	0.58	4.0	74.	60 8
240.	-7.	-0.46E 04	0.46E 04	0.14E-01	0.46E 04	0.46	5.0	83.	60 9
248.	-7.	-0.42E 04	0.42E 04	0.12E-01	0.42E 04	0.37	4.7	79.	60 10
240.	-1.	-0.52E 03	0.52E 03	0.	0.52E 03	0.13	4.5	74.	60 11
248.	-5.	-0.29E 04	0.29E 04	0.43E 00	0.29E 04	0.27	5.0	78.	60 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-15.	-0.11E 06	0.11E 06	0.23E 01	0.11E 06	0.52	4.5	76.	1960

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-26.	-0.16E 05	0.16E 05	0.	0.16E 05	0.68	5.3	72.	61 1
224.	-26.	-0.15E 05	0.15E 05	0.87E 00	0.15E 05	0.79	4.7	79.	61 2
248.	-8.	-0.48E 04	0.48E 04	0.22E 01	0.48E 04	0.73	4.4	81.	61 3
240.	-25.	-0.15E 05	0.15E 05	0.13E 01	0.15E 05	0.91	4.9	78.	61 4
248.	-3.	-0.21E 04	0.21E 04	0.14E-01	0.21E 04	0.40	3.8	73.	61 5
240.	-3.	-0.16E 04	0.16E 04	0.	0.16E 04	0.45	4.2	74.	61 6
248.	-1.	-0.47E 03	0.47E 03	0.	0.47E 03	0.23	3.0	63.	61 7
248.	-14.	-0.92E 04	0.92E 04	0.	0.92E 04	0.48	3.9	70.	61 8
240.	-127.	-0.78E 05	0.78E 05	0.	0.78E 05	0.85	6.5	79.	61 9
248.	-0.	-0.18E 03	0.18E 03	0.	0.18E 03	0.06	5.5	70.	61 10
240.	-7.	-0.42E 04	0.42E 04	0.95E-02	0.42E 04	0.48	4.5	78.	61 11
248.	-12.	-0.79E 04	0.79E 04	0.13E 01	0.79E 04	0.70	4.9	80.	61 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-21.	-0.16E 06	0.16E 06	0.56E 01	0.16E 06	0.56	4.5	76.	1961

STATION = 1 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-27.	-0.17E 05	0.17E 05	0.	0.17E 05	0.72	4.8	77.	62 1
224.	-24.	-0.14E 05	0.14E 05	0.43E 00	0.14E 05	0.95	4.7	78.	62 2
248.	-11.	-0.72E 04	0.72E 04	0.42E 00	0.72E 04	0.69	5.1	82.	62 3
240.	-10.	-0.60E 04	0.60E 04	0.42E 00	0.60E 04	0.63	4.2	77.	62 4
248.	-2.	-0.11E 04	0.11E 04	0.84E-02	0.11E 04	0.28	3.7	58.	62 5
240.	-3.	-0.21E 04	0.21E 04	0.	0.21E 04	0.35	3.8	70.	62 6
248.	-17.	-0.11E 05	0.11E 05	0.	0.11E 05	0.73	4.0	74.	62 7
248.	-9.	-0.60E 04	0.60E 04	0.	0.60E 04	0.47	4.3	72.	62 8
240.	-4.	-0.27E 04	0.27E 04	0.	0.27E 04	0.34	3.9	77.	62 9
248.	-18.	-0.11E 05	0.11E 05	0.14E-01	0.11E 05	0.41	4.4	77.	62 10
240.	-23.	-0.14E 05	0.14E 05	0.42E 00	0.14E 05	0.62	5.4	77.	62 11
248.	-11.	-0.73E 04	0.73E 04	0.43E 00	0.73E 04	0.46	4.4	74.	62 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-13.	-0.10E 06	0.10E 06	0.22E 01	0.10E 06	0.55	4.4	74.	1962

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-17.	-0.11E 05	0.11E 05	0.86E 00	0.11E 05	0.58	4.6	77.	63 1
224.	-18.	-0.11E 05	0.11E 05	0.	0.11E 05	0.69	5.0	77.	63 2
248.	-14.	-0.88E 04	0.88E 04	0.13E 01	0.88E 04	0.74	4.5	80.	63 3
240.	-28.	-0.17E 05	0.17E 05	0.30E 01	0.17E 05	0.85	4.3	75.	63 4
248.	-6.	-0.39E 04	0.39E 04	0.	0.39E 04	0.37	3.5	66.	63 5
240.	-27.	-0.17E 05	0.17E 05	0.	0.17E 05	0.89	3.9	75.	63 6
248.	-21.	-0.14E 05	0.14E 05	0.	0.14E 05	0.71	4.1	72.	63 7
248.	-10.	-0.66E 04	0.66E 04	0.	0.66E 04	0.58	4.3	65.	63 8
240.	-4.	-0.22E 04	0.22E 04	0.	0.22E 04	0.14	4.4	58.	63 9
248.	-0.	-0.32E 03	0.32E 03	0.	0.32E 03	0.05	5.1	56.	63 10
240.	-12.	-0.74E 04	0.74E 04	0.24E-01	0.74E 04	0.44	4.9	77.	63 11
248.	-9.	-0.56E 04	0.56E 04	0.42E 00	0.56E 04	0.48	4.7	75.	63 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-14.	-0.10E 06	0.10E 06	0.57E 01	0.10E 06	0.54	4.4	73.	1963

YEARLY SUMMARY

STATION = 1 SZ		DEPTH = BREAKING		SHORELINE ANGLE = 98.00			
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
248.	-17.	-0.88E 04	0.88E 04	0.	0.88E 04	0.71	4.9
232.	-82.	-0.49E 05	0.49E 05	0.84E-02	0.49E 05	0.93	79.
248.	-22.	-0.14E 05	0.14E 05	0.22E-01	0.14E 05	0.85	5.2
240.	-5.	-0.30E 04	0.30E 04	0.	0.30E 04	0.63	5.3
248.	-5.	-0.32E 04	0.32E 04	0.	0.32E 04	0.37	86.
240.	-1.	-0.52E 03	0.52E 03	0.	0.52E 03	0.20	69.
248.	-44.	-0.28E 05	0.28E 05	0.	0.28E 05	0.98	55.
248.	-22.	-0.14E 05	0.14E 05	0.15E 01	0.14E 05	0.92	77.
240.	-3.	-0.21E 04	0.21E 04	0.39E-01	0.21E 04	0.22	4.2
248.	-52.	-0.33E 05	0.33E 05	0.92E-02	0.33E 05	0.48	4.3
240.	-10.	-0.63E 04	0.63E 04	0.69E-02	0.63E 04	0.42	5.9
248.	-25.	-0.16E 05	0.16E 05	0.43E 00	0.16E 05	0.58	4.3
YEARLY SUMMARY							
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
2928.	-24.	-0.18E 06	0.18E 06	0.20E 01	0.18E 06	0.61	4.5
						AVANG	DATE
						76.	1964

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
248.	-80.	-0.51E 05	0.51E 05	0.37E-01	0.51E 05	0.85	5.2
224.	-13.	-0.73E 04	0.73E 04	0.85E 00	0.73E 04	0.53	4.8
248.	-14.	-0.91E 04	0.91E 04	0.85E 00	0.91E 04	0.71	4.8
240.	-12.	-0.74E 04	0.74E 04	0.17E-01	0.74E 04	0.72	4.3
248.	-1.	-0.37E 03	0.37E 03	0.	0.37E 03	0.17	3.5
240.	-5.	-0.31E 04	0.31E 04	0.13E 01	0.31E 04	0.50	4.1
248.	-13.	-0.85E 04	0.85E 04	0.	0.85E 04	0.75	3.7
248.	-37.	-0.23E 05	0.23E 05	0.	0.23E 05	0.92	3.9
240.	-21.	-0.13E 05	0.13E 05	0.34E-01	0.13E 05	0.67	5.2
248.	-14.	-0.92E 04	0.92E 04	0.	0.92E 04	0.41	5.1
240.	-36.	-0.22E 05	0.22E 05	0.71E-02	0.22E 05	0.71	4.9
248.	-2.	-0.12E 04	0.12E 04	0.12E-01	0.12E 04	0.22	4.3
YEARLY SUMMARY							
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
2920.	-21.	-0.16E 06	0.16E 06	0.31E 01	0.16E 06	0.60	4.4
						AVANG	DATE
						76.	1965

STATION = 1 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-6.	-0.36E 04	0.36E 04	0.43E 00	0.36E 04	0.35	5.0	77.	66 1
224.	-24.	-0.14E 05	0.14E 05	0.87E 00	0.14E 05	0.70	5.5	81.	66 2
248.	-10.	-0.61E 04	0.61E 04	0.86E 00	0.61E 04	0.52	4.7	73.	66 3
240.	-34.	-0.21E 05	0.21E 05	0.13E 01	0.21E 05	0.95	4.8	83.	66 4
248.	-19.	-0.12E 05	0.12E 05	0.12E-01	0.12E 05	0.75	4.2	76.	66 5
240.	-4.	-0.25E 04	0.25E 04	0.	0.25E 04	0.32	4.6	78.	66 6
248.	-11.	-0.72E 04	0.72E 04	0.	0.72E 04	0.53	3.7	64.	66 7
248.	-40.	-0.26E 05	0.26E 05	0.	0.26E 05	0.88	3.9	71.	66 8
240.	-22.	-0.13E 05	0.13E 05	0.42E 00	0.13E 05	0.83	4.2	73.	66 9
248.	-12.	-0.79E 04	0.79E 04	0.32E-01	0.79E 04	0.29	4.4	74.	66 10
240.	-11.	-0.71E 04	0.71E 04	0.	0.71E 04	0.45	4.8	80.	66 11
248.	-5.	-0.34E 04	0.34E 04	0.42E 00	0.34E 04	0.45	4.8	76.	66 12

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-16.	-0.12E 06	0.12E 06	0.44E 01	0.12E 06	0.58	4.5	75.	1966

A-78

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-7.	-0.42E 04	0.42E 04	0.28E-01	0.42E 04	0.51	5.0	83.	67 1
224.	-8.	-0.46E 04	0.46E 04	0.13E 01	0.46E 04	0.63	4.5	79.	67 2
248.	-15.	-0.95E 04	0.95E 04	0.13E 01	0.95E 04	0.58	4.4	78.	67 3
240.	-15.	-0.92E 04	0.92E 04	0.13E 01	0.92E 04	0.73	4.1	76.	67 4
248.	-45.	-0.29E 05	0.29E 05	0.	0.29E 05	1.07	4.3	73.	67 5
240.	-15.	-0.90E 04	0.90E 04	0.	0.90E 04	0.41	3.7	73.	67 6
248.	-24.	-0.16E 05	0.16E 05	0.	0.16E 05	0.82	4.1	75.	67 7
248.	-19.	-0.12E 05	0.12E 05	0.	0.12E 05	0.66	3.6	72.	67 8
240.	-2.	-0.12E 04	0.12E 04	0.95E-02	0.12E 04	0.25	4.3	64.	67 9
248.	-4.	-0.28E 04	0.28E 04	0.85E 00	0.28E 04	0.33	4.5	76.	67 10
240.	-121.	-0.75E 05	0.75E 05	0.	0.75E 05	1.04	5.0	73.	67 11
248.	-44.	-0.28E 05	0.28E 05	0.13E 01	0.28E 05	0.81	4.6	78.	67 12

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-27.	-0.20E 06	0.20E 06	0.61E 01	0.20E 06	0.65	4.3	75.	1967

STATION = 1 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-12.	-0.74E 04	0.74E 04	0.85E 00	0.74E 04	0.42	4.6	77.	68 1
232.	-21.	-0.12E 05	0.12E 05	0.26E-01	0.12E 05	0.61	5.1	73.	68 2
248.	-30.	-0.19E 05	0.19E 05	0.42E 00	0.19E 05	0.78	4.8	72.	68 3
240.	-21.	-0.13E 05	0.13E 05	0.	0.13E 05	0.75	4.1	76.	68 4
248.	-24.	-0.15E 05	0.15E 05	0.71E-02	0.15E 05	0.79	3.8	73.	68 5
240.	-22.	-0.14E 05	0.14E 05	0.	0.14E 05	0.73	4.9	71.	68 6
248.	-21.	-0.13E 05	0.13E 05	0.	0.13E 05	0.56	3.8	69.	68 7
248.	-7.	-0.47E 04	0.47E 04	0.	0.47E 04	0.43	4.0	64.	68 8
240.	-5.	-0.31E 04	0.31E 04	0.17E 01	0.31E 04	0.40	3.6	70.	68 9
248.	-3.	-0.17E 04	0.17E 04	0.	0.17E 04	0.22	4.4	67.	68 10
240.	-24.	-0.15E 05	0.15E 05	0.45E 00	0.15E 05	0.81	5.0	78.	68 11
248.	-27.	-0.17E 05	0.17E 05	0.22E-01	0.17E 05	0.82	5.0	78.	68 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-18.	-0.14E 06	0.14E 06	0.35E 01	0.14E 06	0.61	4.4	73.	1968

THIRTEEN YEAR SUMMARY

MEXICO BEACH ST = 1 SZ

SHORELINE ANGLE = 98.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

MEAN NET ENERGY FLUX = -20.

NET LONGSHORE TRANSPORT = -0.19E 07

NET TRANSPORT EASTERLY OR NORTHERLY

GROSS LONGSHORE TRANSPORT = 0.19E 07

NET LONGSHORE TRANSPORT RIGHT = 0.61E 02

NET LONGSHORE TRANSPORT LEFT = 0.19E 07

MEAN SIGNIFICANT HEIGHT = 0.61 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 75.4 DEGREES RELATIVE TO SHORE

D E F I N I T I O N S

TSUM = NUMBER OF OBSERVATIONS

PLS = MEAN ENERGY FLUX (FT LB/SEC/LIN FT)

Q NET = NET LONGSHORE TRANSPORT (CU YD/TIME)

Q GROSS = GROSS LONGSHORE TRANSPORT NO DIRECTION

Q RIGHT = NET TRANSPORT RATE TO WEST OR SOUTH

Q LEFT = NET TRANSPORT RATE TO EAST OR NORTH

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

STATION = 2 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-49.	-0.32E 05	0.32E 05	0.66E 01	0.32E 05	0.90	5.6	76.	56 1
232.	-34.	-0.20E 05	0.21E 05	0.23E 02	0.21E 05	1.04	4.7	83.	56 2
248.	-18.	-0.12E 05	0.12E 05	0.28E 02	0.12E 05	0.90	4.5	80.	56 3
240.	-50.	-0.31E 05	0.31E 05	0.15E 02	0.31E 05	1.03	4.8	76.	56 4
248.	-1.	-0.95E 03	0.95E 03	0.18E 00	0.95E 03	0.23	3.6	73.	56 5
240.	-7.	-0.45E 04	0.45E 04	0.95E 01	0.45E 04	0.54	3.7	60.	56 6
248.	-30.	-0.19E 05	0.19E 05	0.62E 00	0.19E 05	0.90	3.9	69.	56 7
248.	-24.	-0.16E 05	0.16E 05	0.90E 00	0.16E 05	0.90	4.5	73.	56 8
240.	-22.	-0.14E 05	0.14E 05	0.16E 01	0.14E 05	0.35	4.8	67.	56 9
248.	-16.	-0.10E 05	0.10E 05	0.29E 01	0.10E 05	0.39	4.4	79.	56 10
240.	-10.	-0.60E 04	0.60E 04	0.43E 00	0.60E 04	0.47	4.7	75.	56 11
248.	-10.	-0.62E 04	0.62E 04	0.16E 02	0.62E 04	0.61	4.8	76.	56 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-23.	-0.17E 06	0.17E 06	0.10E 03	0.17E 06	0.69	4.5	74.	1956

YEARLY SUMMARY

A-80

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-31.	-0.20E 05	0.20E 05	0.14E 02	0.20E 05	0.90	4.6	80.	57 1
224.	-39.	-0.22E 05	0.22E 05	0.63E 01	0.22E 05	0.83	4.7	77.	57 2
248.	-37.	-0.23E 05	0.23E 05	0.12E 02	0.23E 05	0.95	4.9	78.	57 3
240.	-11.	-0.67E 04	0.67E 04	0.19E 02	0.67E 04	0.46	5.0	85.	57 4
248.	-27.	-0.17E 05	0.17E 05	0.61E 01	0.17E 05	0.64	4.2	83.	57 5
240.	-21.	-0.13E 05	0.13E 05	0.75E 01	0.13E 05	0.73	4.5	83.	57 6
248.	-19.	-0.12E 05	0.12E 05	0.12E 05	0.12E 05	1.03	4.7	77.	57 7
248.	-37.	-0.24E 05	0.24E 05	0.25E 00	0.24E 05	0.82	4.7	67.	57 8
240.	-27.	-0.17E 05	0.17E 05	0.22E 02	0.17E 05	0.86	4.7	82.	57 9
248.	-3.	-0.21E 04	0.21E 04	0.39E 01	0.21E 04	0.30	4.4	72.	57 10
240.	-12.	-0.72E 04	0.72E 04	0.58E 01	0.72E 04	0.64	4.5	76.	57 11
248.	-10.	-0.64E 04	0.64E 04	0.87E 01	0.64E 04	0.53	5.1	79.	57 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-23.	-0.17E 06	0.17E 06	0.11E 03	0.17E 06	0.72	4.7	78.	1957

YEARLY SUMMARY

STATION = 2 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-64.	-0.40E 05	0.40E 05	0.40E 01	0.40E 05	0.92	5.7	77.	58 1
248.	-218.	-0.13E 06	0.13E 06	0.12E 02	0.13E 06	1.28	5.5	76.	58 2
248.	-33.	-0.21E 05	0.21E 05	0.18E 02	0.21E 05	0.81	4.8	77.	58 3
240.	-16.	-0.99E 04	0.10E 05	0.25E 02	0.99E 04	0.87	4.5	80.	58 4
248.	-3.	-0.17E 04	0.17E 04	0.42E 00	0.17E 04	0.28	4.0	78.	58 5
240.	-40.	-0.25E 05	0.25E 05	0.40E 01	0.25E 05	0.81	3.8	74.	58 6
248.	-6.	-0.35E 04	0.35E 04	0.10E 01	0.35E 04	0.44	3.5	75.	58 7
248.	-21.	-0.13E 05	0.13E 05	0.83E 00	0.13E 05	0.68	3.9	67.	58 8
240.	-2.	-0.95E 03	0.97E 03	0.11E 02	0.96E 03	0.31	4.0	76.	58 9
248.	-0.	-0.19E 03	0.19E 03	0.15E 01	0.19E 03	0.11	4.2	60.	58 10
240.	-8.	-0.47E 04	0.48E 04	0.36E 01	0.47E 04	0.37	4.5	78.	58 11
248.	-34.	-0.22E 05	0.22E 05	0.17E 00	0.22E 05	0.46	5.0	70.	58 12
YEARLY SUMMARY									
TSUM 2920.	MEAN PLS -36.	Q NET -0.27E 06	Q GROSS 0.27E 06	Q RIGHT 0.79E 02	Q LEFT 0.27E 06	H MEAN 0.61	AVPER 4.5	AVANG 75.	DATE 1958

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-9.	-0.60E 04	0.60E 04	0.27E 01	0.60E 04	0.45	4.6	72.	59 1
224.	-40.	-0.23E 05	0.23E 05	0.14E 02	0.23E 05	0.67	4.6	82.	59 2
248.	-24.	-0.15E 05	0.15E 05	0.15E 02	0.15E 05	0.74	4.7	76.	59 3
240.	-16.	-0.10E 05	0.10E 05	0.10E 02	0.10E 05	0.69	4.4	78.	59 4
248.	-5.	-0.32E 04	0.33E 04	0.14E 02	0.33E 04	0.47	4.6	81.	59 5
240.	-10.	-0.62E 04	0.62E 04	0.66E 01	0.62E 04	0.67	4.1	77.	59 6
248.	-10.	-0.65E 04	0.65E 04	0.11E 01	0.65E 04	0.66	4.0	77.	59 7
248.	-34.	-0.22E 05	0.22E 05	0.21E 00	0.22E 05	0.68	4.5	72.	59 8
240.	-35.	-0.22E 05	0.22E 05	0.47E 01	0.22E 05	0.77	5.1	77.	59 9
248.	-18.	-0.12E 05	0.12E 05	0.78E 01	0.12E 05	0.65	4.7	80.	59 10
240.	-5.	-0.32E 04	0.32E 04	0.97E 01	0.32E 04	0.28	5.1	78.	59 11
248.	-13.	-0.85E 04	0.86E 04	0.53E 01	0.85E 04	0.50	5.2	77.	59 12
YEARLY SUMMARY									
TSUM 2920.	MEAN PLS -18.	Q NET -0.14E 06	Q GROSS 0.14E 06	Q RIGHT 0.91E 02	Q LEFT 0.14E 06	H MEAN 0.60	AVPER 4.6	AVANG 77.	DATE 1959

STATION = 2 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-20.	-0.13E 05	0.13E 05	0.58E 01	0.13E 05	0.70	4.8	74.	60 1
232.	-94.	-0.56E 05	0.56E 05	0.39E 01	0.56E 05	1.09	5.7	78.	60 2
248.	-17.	-0.11E 05	0.11E 05	0.72E 01	0.11E 05	0.68	4.9	80.	60 3
240.	-7.	-0.46E 04	0.46E 04	0.50E 01	0.46E 04	0.41	4.5	75.	60 4
248.	-5.	-0.30E 04	0.30E 04	0.72E 00	0.30E 04	0.35	3.5	66.	60 5
240.	-4.	-0.26E 04	0.26E 04	0.99E 00	0.26E 04	0.35	3.9	73.	60 6
248.	-13.	-0.84E 04	0.84E 04	0.17E 01	0.84E 04	0.81	4.1	74.	60 7
248.	-16.	-0.10E 05	0.10E 05	0.32E 01	0.10E 05	0.58	4.0	73.	60 8
240.	-8.	-0.49E 04	0.49E 04	0.67E 01	0.49E 04	0.45	5.0	82.	60 9
248.	-8.	-0.50E 04	0.50E 04	0.11E 00	0.50E 04	0.37	4.7	79.	60 10
240.	-1.	-0.33E 03	0.33E 03	0.48E 01	0.33E 03	0.13	4.5	72.	60 11
248.	-4.	-0.25E 04	0.25E 04		0.25E 04	0.25	5.0	78.	60 12

## YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-16.	-0.12E 06	0.12E 06	0.40E 02	0.12E 06	0.51	4.5	75.	1960

1-24

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-26.	-0.16E 05	0.16E 05	0.28E 01	0.16E 05	0.66	5.3	71.	61 1
224.	-23.	-0.13E 05	0.13E 05	0.12E 02	0.13E 05	0.75	4.7	78.	61 2
248.	-7.	-0.43E 04	0.43E 04	0.16E 02	0.43E 04	0.67	4.4	81.	61 3
240.	-26.	-0.16E 05	0.16E 05	0.13E 02	0.16E 05	0.87	4.9	78.	61 4
248.	-3.	-0.19E 04	0.20E 04	0.24E 01	0.19E 04	0.38	3.8	72.	61 5
240.	-3.	-0.16E 04	0.16E 04	0.99E 01	0.16E 04	0.39	4.2	74.	61 6
248.	-1.	-0.41E 03	0.41E 03	0.21E 00	0.41E 03	0.21	3.0	63.	61 7
248.	-17.	-0.11E 05	0.11E 05	0.63E 01	0.11E 05	0.49	3.9	70.	61 8
240.	-177.	-0.11E 06	0.11E 06	0.37E 01	0.11E 06	0.91	6.5	79.	61 9
248.	-0.	-0.96E 02	0.96E 02	0.14E 02	0.96E 02	0.05	5.5	67.	61 10
240.	-6.	-0.35E 04	0.35E 04		0.35E 04	0.44	4.5	77.	61 11
248.	-13.	-0.80E 04	0.81E 04		0.81E 04	0.66	4.9	80.	61 12

## YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-25.	-0.18E 06	0.19E 06	0.80E 02	0.19E 06	0.54	4.5	75.	1961

STATION = 2 SZ		DEPTH = BREAKING		SHORELINE ANGLE = 98.00			
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
248.	-30.	-0.19E 05	0.19E 05	0.57E 01	0.19E 05	0.69	4.8
224.	-27.	-0.15E 05	0.15E 05	0.11E 02	0.15E 05	0.93	4.7
248.	-12.	-0.78E 04	0.79E 04	0.18E 02	0.78E 04	0.66	5.1
240.	-9.	-0.56E 04	0.56E 04	0.80E 01	0.56E 04	0.61	4.2
248.	-1.	-0.94E 03	0.94E 03	0.39E 00	0.94E 03	0.25	3.7
240.	-3.	-0.18E 04	0.18E 04	0.14E 01	0.18E 04	0.33	3.8
248.	-14.	-0.91E 04	0.91E 04	0.96E 00	0.91E 04	0.71	4.0
248.	-8.	-0.50E 04	0.50E 04	0.	0.50E 04	0.45	4.3
240.	-4.	-0.26E 04	0.26E 04	0.86E 00	0.26E 04	0.33	3.9
248.	-22.	-0.14E 05	0.14E 05	0.46E-01	0.14E 05	0.42	4.4
240.	-26.	-0.16E 05	0.16E 05	0.14E 02	0.16E 05	0.59	5.4
248.	-13.	-0.82E 04	0.82E 04	0.74E 00	0.82E 04	0.45	4.4
YEARLY SUMMARY							
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
2920.	-14.	-0.11E 06	0.11E 06	0.61E 02	0.11E 06	0.53	4.4
						AVANG	DATE
						74.	1962

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
248.	-20.	-0.13E 05	0.13E 05	0.12E 02	0.13E 05	0.58	4.6
224.	-20.	-0.12E 05	0.12E 05	0.64E 01	0.12E 05	0.67	5.0
248.	-17.	-0.11E 05	0.11E 05	0.11E 02	0.11E 05	0.73	4.5
240.	-29.	-0.18E 05	0.18E 05	0.16E 02	0.18E 05	0.83	4.3
248.	-7.	-0.43E 04	0.43E 04	0.21E 00	0.43E 04	0.38	3.5
240.	-31.	-0.19E 05	0.19E 05	0.23E 01	0.19E 05	0.91	3.9
248.	-23.	-0.15E 05	0.15E 05	0.15E 01	0.15E 05	0.73	4.1
248.	-9.	-0.60E 04	0.60E 04	0.	0.60E 04	0.56	4.3
240.	-5.	-0.29E 04	0.29E 04	0.11E 01	0.29E 04	0.15	4.4
248.	-0.	-0.27E 03	0.27E 03	0.	0.27E 03	0.05	5.1
240.	-13.	-0.82E 04	0.82E 04	0.44E 01	0.82E 04	0.41	4.9
248.	-8.	-0.52E 04	0.52E 04	0.43E 01	0.52E 04	0.46	4.7
YEARLY SUMMARY							
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
2920.	-15.	-0.11E 06	0.11E 06	0.60E 02	0.11E 06	0.54	4.4
						AVANG	DATE
						72.	1963

STATION = 2 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-15.	-0.96E 04	0.96E 04	0.16E 02	0.96E 04	0.69	4.9	79.	64 1
232.	-99.	-0.59E 05	0.59E 05	0.95E 01	0.59E 05	0.91	5.2	75.	64 2
248.	-24.	-0.15E 05	0.15E 05	0.17E 02	0.15E 05	0.81	5.3	83.	64 3
240.	-6.	-0.36E 04	0.36E 04	0.25E 02	0.36E 04	0.62	4.3	85.	64 4
248.	-5.	-0.30E 04	0.30E 04	0.54E 01	0.30E 04	0.37	3.8	68.	64 5
240.	-1.	-0.55E 03	0.55E 03	0.41E 00	0.55E 03	0.20	3.0	52.	64 6
248.	-49.	-0.31E 05	0.31E 05	0.83E 00	0.31E 05	1.01	4.2	77.	64 7
248.	-22.	-0.14E 05	0.14E 05	0.36E 01	0.14E 05	0.92	4.3	74.	64 8
240.	-2.	-0.15E 04	0.15E 04	0.44E 00	0.15E 04	0.20	4.5	72.	64 9
248.	-64.	-0.41E 05	0.41E 05	0.65E 00	0.41E 05	0.47	5.9	76.	64 10
240.	-12.	-0.77E 04	0.77E 04	0.65E 00	0.77E 04	0.43	4.3	74.	64 11
248.	-22.	-0.14E 05	0.14E 05	0.88E 01	0.14E 05	0.55	5.0	85.	64 12

YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-27.	-0.20E 06	0.20E 06	0.88E 02	0.20E 06	0.60	4.5	75.	1964

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-99.	-0.63E 05	0.63E 05	0.45E 01	0.63E 05	0.87	5.2	74.	65 1
224.	-14.	-0.81E 04	0.81E 04	0.16E 02	0.81E 04	0.52	4.8	82.	65 2
248.	-14.	-0.92E 04	0.92E 04	0.14E 02	0.92E 04	0.69	4.8	79.	65 3
240.	-12.	-0.71E 04	0.71E 04	0.94E 01	0.71E 04	0.69	4.3	78.	65 4
248.	-0.	-0.31E 03	0.31E 03	0.37E 00	0.31E 03	0.17	3.5	59.	65 5
240.	-5.	-0.31E 04	0.31E 04	0.10E 02	0.31E 04	0.48	4.1	77.	65 6
248.	-12.	-0.78E 04	0.78E 04	0.12E 01	0.78E 04	0.75	3.7	77.	65 7
248.	-36.	-0.23E 05	0.23E 05	0.32E 00	0.23E 05	0.94	3.9	73.	65 8
240.	-22.	-0.13E 05	0.13E 05	0.57E 01	0.13E 05	0.64	5.2	83.	65 9
248.	-17.	-0.11E 05	0.11E 05	0.39E 01	0.11E 05	0.39	5.1	73.	65 10
240.	-44.	-0.27E 05	0.27E 05	0.97E-01	0.27E 05	0.74	4.9	77.	65 11
248.	-1.	-0.82E 03	0.83E 03	0.58E 01	0.83E 03	0.20	4.3	75.	65 12

YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-23.	-0.17E 06	0.17E 06	0.71E 02	0.17E 06	0.59	4.4	76.	1965

STATION = 2 SZ		DEPTH = BREAKING		SHORELINE ANGLE = 98.00			
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
248.	-6.	-0.38E 04	0.38E 04	0.52E 01	0.38E 04	0.35	5.0
224.	-27.	-0.16E 05	0.16E 05	0.86E 01	0.16E 05	0.69	5.5
248.	-10.	-0.62E 04	0.62E 04	0.77E 01	0.62E 04	0.49	4.7
240.	-33.	-0.20E 05	0.20E 05	0.12E 02	0.20E 05	0.91	4.8
248.	-21.	-0.13E 05	0.13E 05	0.72E 00	0.13E 05	0.77	4.2
240.	-4.	-0.22E 04	0.22E 04	0.10E 01	0.22E 04	0.32	4.6
248.	-10.	-0.64E 04	0.64E 04	0.32E 01	0.64E 04	0.53	3.7
248.	-44.	-0.28E 05	0.28E 05	0.15E 02	0.28E 05	0.90	3.9
240.	-23.	-0.14E 05	0.14E 05	0.26E 00	0.14E 05	0.83	4.2
248.	-14.	-0.89E 04	0.89E 04	0.63E 01	0.89E 04	0.29	4.4
240.	-12.	-0.77E 04	0.77E 04	0.76E 01	0.77E 04	0.43	4.8
248.	-5.	-0.34E 04	0.34E 04	0.76E 01	0.34E 04	0.42	4.8
TSUM		Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
2920.	-17.	-0.13E 06	0.13E 06	0.68E 02	0.13E 06	0.57	4.5
		YEARLY SUMMARY					
				Q RIGHT	Q LEFT	H MEAN	AVANG
				0.68E 02	0.13E 06	0.57	74.
						DATE	1966

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
248.	-6.	-0.41E 04	0.41E 04	0.83E 01	0.41E 04	0.50	5.0
224.	-8.	-0.47E 04	0.47E 04	0.21E 02	0.47E 04	0.61	4.5
248.	-15.	-0.96E 04	0.97E 04	0.88E 01	0.96E 04	0.57	4.4
240.	-15.	-0.91E 04	0.91E 04	0.95E 01	0.91E 04	0.71	4.1
248.	-55.	-0.35E 05	0.35E 05	0.11E 02	0.35E 05	1.10	4.3
240.	-15.	-0.93E 04	0.93E 04	0.	0.93E 04	0.42	3.7
248.	-25.	-0.16E 05	0.16E 05	0.	0.16E 05	0.84	4.1
248.	-18.	-0.12E 05	0.12E 05	0.16E 01	0.12E 05	0.65	3.6
240.	-2.	-0.12E 04	0.12E 04	0.25E 01	0.12E 04	0.24	4.3
248.	-4.	-0.25E 04	0.25E 04	0.32E 01	0.25E 04	0.31	4.5
240.	-141.	-0.87E 05	0.87E 05	0.	0.87E 05	1.06	5.0
248.	-46.	-0.29E 05	0.29E 05	0.19E 02	0.29E 05	0.80	4.6
TSUM		Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
2920.	-29.	-0.22E 06	0.22E 06	0.85E 02	0.22E 06	0.65	4.3
		YEARLY SUMMARY					
				Q RIGHT	Q LEFT	H MEAN	AVANG
				0.85E 02	0.22E 06	0.65	74.
						DATE	1967

STATION = 2 SZ		DEPTH = BREAKING		SHORELINE ANGLE = 98.00							
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE		
248.	-12.	-0.79E 04	0.79E 04	0.34E 01	0.79E 04	0.40	4.6	77.	68 1		
232.	-21.	-0.12E 05	0.12E 05	0.21E 01	0.12E 05	0.57	5.1	73.	68 2		
248.	-33.	-0.21E 05	0.21E 05	0.89E 01	0.21E 05	0.77	4.8	72.	68 3		
240.	-19.	-0.12E 05	0.12E 05	0.33E 01	0.12E 05	0.73	4.1	76.	68 4		
248.	-25.	-0.16E 05	0.16E 05	0.97E-01	0.16E 05	0.79	3.8	73.	68 5		
240.	-23.	-0.14E 05	0.14E 05	0.	0.14E 05	0.74	4.9	69.	68 6		
248.	-23.	-0.15E 05	0.15E 05	0.	0.15E 05	0.56	3.8	68.	68 7		
248.	-7.	-0.43E 04	0.43E 04	0.	0.43E 04	0.42	4.0	62.	68 8		
240.	-5.	-0.31E 04	0.31E 04	0.13E 02	0.31E 04	0.40	3.6	68.	68 9		
248.	-2.	-0.14E 04	0.14E 04	0.28E 01	0.14E 04	0.21	4.4	65.	68 10		
240.	-27.	-0.17E 05	0.17E 05	0.52E 01	0.17E 05	0.80	5.0	78.	68 11		
248.	-29.	-0.19E 05	0.19E 05	0.68E 01	0.19E 05	0.81	5.0	78.	68 12		
YEARLY SUMMARY											
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE		
2928.	-19.	-0.14E 06	0.14E 06	0.45E 02	0.14E 06	0.60	4.4	72.	1968		

THIRTEEN YEAR SUMMARY

MEXICO BEACH ST = 2 SZ

SHORELINE ANGLE = 98.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

MEAN NET ENERGY FLUX = -22.

NET LONGSHORE TRANSPORT = -0.21E 07

NET TRANSPORT EASTERLY OR NORTHERLY

GROSS LONGSHORE TRANSPORT = 0.21E 07

NET LONGSHORE TRANSPORT RIGHT = 0.98E 03

NET LONGSHORE TRANSPORT LEFT = 0.21E 07

MEAN SIGNIFICANT HEIGHT = 0.60 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 74.6 DEGREES RELATIVE TO SHORE

D E F I N I T I O N S

TSUM = NUMBER OF OBSERVATIONS

PLS = MEAN ENERGY FLUX (FT LB/SEC/LIN FT)

Q NET = NET LONGSHORE TRANSPORT (CU YD/TIME)

Q GROSS = GROSS LONGSHORE TRANSPORT NO DIRECTION

Q RIGHT = NET TRANSPORT RATE TO WEST OR SOUTH

Q LEFT = NET TRANSPORT RATE TO EAST OR NORTH

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

STATION = 3 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-48.	-0.30E 05	0.30E 05	0.15E 02	0.30E 05	0.90	5.6	77.	56 1
232.	-32.	-0.19E 05	0.19E 05	0.63E 02	0.19E 05	1.03	4.7	84.	56 2
248.	-21.	-0.13E 05	0.13E 05	0.68E 02	0.13E 05	0.91	4.5	81.	56 3
240.	-57.	-0.35E 05	0.35E 05	0.40E 02	0.35E 05	1.09	4.8	77.	56 4
248.	-1.	-0.80E 03	0.80E 03	0.22E 01	0.80E 03	0.23	3.6	74.	56 5
240.	-9.	-0.52E 04	0.53E 04	0.28E 02	0.53E 04	0.55	3.7	65.	56 6
248.	-37.	-0.24E 05	0.24E 05	0.45E 01	0.24E 05	0.97	3.9	71.	56 7
248.	-28.	-0.18E 05	0.18E 05	0.18E 01	0.18E 05	0.96	4.5	76.	56 8
240.	-18.	-0.11E 05	0.11E 05	0.15E 02	0.11E 05	0.34	4.8	70.	56 9
248.	-14.	-0.87E 04	0.88E 04	0.92E 01	0.88E 04	0.38	4.4	80.	56 10
240.	-10.	-0.64E 04	0.64E 04	0.11E 01	0.64E 04	0.46	4.7	76.	56 11
248.	-10.	-0.62E 04	0.62E 04	0.35E 02	0.62E 04	0.59	4.8	79.	56 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-24.	-0.18E 06	0.18E 06	0.28E 03	0.18E 06	0.70	4.5	76.	1956

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-35.	-0.23E 05	0.23E 05	0.26E 02	0.23E 05	0.92	4.6	81.	57 1
224.	-41.	-0.24E 05	0.24E 05	0.27E 02	0.24E 05	0.86	4.7	78.	57 2
248.	-45.	-0.29E 05	0.29E 05	0.33E 02	0.29E 05	0.97	4.9	79.	57 3
240.	-14.	-0.84E 04	0.85E 04	0.47E 02	0.85E 04	0.46	5.0	85.	57 4
248.	-25.	-0.16E 05	0.16E 05	0.21E 02	0.16E 05	0.63	4.2	83.	57 5
240.	-22.	-0.14E 05	0.14E 05	0.39E 02	0.14E 05	0.72	4.5	83.	57 6
248.	-21.	-0.13E 05	0.13E 05	0.	0.13E 05	1.08	4.7	79.	57 7
248.	-35.	-0.22E 05	0.22E 05	0.13E 01	0.22E 05	0.84	4.7	70.	57 8
240.	-28.	-0.17E 05	0.17E 05	0.12E 03	0.17E 05	0.85	4.7	83.	57 9
248.	-4.	-0.26E 04	0.27E 04	0.84E 01	0.27E 04	0.31	4.4	74.	57 10
240.	-11.	-0.69E 04	0.70E 04	0.27E 02	0.69E 04	0.65	4.5	79.	57 11
248.	-10.	-0.66E 04	0.67E 04	0.25E 02	0.66E 04	0.53	5.1	79.	57 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-24.	-0.18E 06	0.18E 06	0.37E 03	0.18E 06	0.73	4.7	79.	1957

STATION = 3 SZ		DEPTH = BREAKING		SHORELINE ANGLE = 98.00			
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
248.	-68.	-0.43E 05	0.43E 05	0.10E 02	0.43E 05	0.94	5.7
224.	-182.	-0.10E 06	0.10E 06	0.49E 02	0.10E 06	1.28	5.5
248.	-33.	-0.21E 05	0.21E 05	0.55E 02	0.21E 05	0.82	4.8
240.	-17.	-0.10E 05	0.10E 05	0.61E 02	0.10E 05	0.86	4.5
248.	-3.	-0.22E 04	0.22E 04	0.42E 01	0.22E 04	0.27	4.0
240.	-45.	-0.28E 05	0.28E 05	0.11E 02	0.28E 05	0.85	3.8
248.	-6.	-0.38E 04	0.38E 04	0.35E 01	0.38E 04	0.45	3.5
248.	-23.	-0.15E 05	0.15E 05	0.26E 01	0.15E 05	0.71	3.9
240.	-2.	-0.10E 04	0.11E 04	0.33E 02	0.10E 04	0.31	4.0
248.	-0.	-0.21E 03	0.21E 03	0.75E 00	0.21E 03	0.10	4.2
240.	-5.	-0.32E 04	0.32E 04	0.98E 01	0.32E 04	0.35	4.5
248.	-44.	-0.28E 05	0.28E 05	0.57E 00	0.28E 05	0.49	5.0
YEARLY SUMMARY							
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
2920.	-35.	-0.26E 06	0.26E 06	0.24E 03	0.26E 06	0.61	4.5
						AVANG	DATE
						76.	1958

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
248.	-11.	-0.73E 04	0.73E 04	0.32E 02	0.73E 04	0.44	4.6
224.	-54.	-0.31E 05	0.31E 05	0.33E 02	0.31E 05	0.70	4.6
248.	-26.	-0.16E 05	0.16E 05	0.53E 02	0.16E 05	0.73	4.7
240.	-16.	-0.97E 04	0.97E 04	0.20E 02	0.97E 04	0.69	4.4
248.	-6.	-0.37E 04	0.37E 04	0.31E 02	0.37E 04	0.49	4.6
240.	-12.	-0.75E 04	0.75E 04	0.19E 02	0.75E 04	0.70	4.1
248.	-11.	-0.72E 04	0.72E 04	0.32E 01	0.72E 04	0.70	4.0
248.	-34.	-0.22E 05	0.22E 05	0.18E 01	0.22E 05	0.70	4.5
240.	-30.	-0.19E 05	0.19E 05	0.32E 02	0.19E 05	0.76	5.1
248.	-19.	-0.12E 05	0.12E 05	0.34E 02	0.12E 05	0.66	4.7
240.	-5.	-0.30E 04	0.31E 04	0.23E 02	0.30E 04	0.28	5.1
248.	-14.	-0.88E 04	0.89E 04	0.13E 02	0.89E 04	0.49	5.2
YEARLY SUMMARY							
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER
2920.	-20.	-0.15E 06	0.15E 06	0.29E 03	0.15E 06	0.61	4.6
						AVANG	DATE
						78.	1959

STATION = 3 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-19.	-0.12E 05	0.12E 05	0.11E 02	0.12E 05	0.70	4.8	75.	60 1
232.	-96.	-0.57E 05	0.57E 05	0.13E 02	0.57E 05	1.13	5.7	79.	60 2
248.	-19.	-0.12E 05	0.12E 05	0.18E 02	0.12E 05	0.68	4.9	80.	60 3
240.	-8.	-0.48E 04	0.49E 04	0.14E 02	0.49E 04	0.41	4.5	78.	60 4
248.	-5.	-0.32E 04	0.32E 04	0.23E 01	0.32E 04	0.35	3.5	68.	60 5
240.	-5.	-0.30E 04	0.30E 04	0.20E 01	0.30E 04	0.36	3.9	74.	60 6
248.	-16.	-0.10E 05	0.10E 05	0.14E 01	0.10E 05	0.88	4.1	76.	60 7
248.	-15.	-0.95E 04	0.95E 04	0.50E 01	0.95E 04	0.57	4.0	74.	60 8
240.	-9.	-0.53E 04	0.54E 04	0.35E 02	0.54E 04	0.47	5.0	82.	60 9
248.	-7.	-0.42E 04	0.42E 04	0.26E 02	0.42E 04	0.36	4.7	79.	60 10
240.	-0.	-0.26E 03	0.26E 03	0.23E 00	0.26E 03	0.12	4.5	73.	60 11
248.	-4.	-0.23E 04	0.23E 04	0.14E 02	0.23E 04	0.24	5.0	80.	60 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-17.	-0.12E 06	0.12E 06	0.14E 03	0.12E 06	0.52	4.5	76.	1960

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-28.	-0.18E 05	0.18E 05	0.92E 01	0.18E 05	0.66	5.3	73.	61 1
224.	-28.	-0.16E 05	0.16E 05	0.35E 02	0.16E 05	0.75	4.7	81.	61 2
248.	-7.	-0.44E 04	0.45E 04	0.59E 02	0.45E 04	0.68	4.4	82.	61 3
240.	-29.	-0.18E 05	0.18E 05	0.33E 02	0.18E 05	0.88	4.9	79.	61 4
248.	-3.	-0.21E 04	0.21E 04	0.74E 01	0.21E 04	0.38	3.8	75.	61 5
240.	-3.	-0.18E 04	0.19E 04	0.46E 02	0.19E 04	0.39	4.2	75.	61 6
248.	-1.	-0.45E 03	0.45E 03	0.22E 01	0.45E 03	0.21	3.0	64.	61 7
248.	-17.	-0.11E 05	0.11E 05	0.27E 01	0.11E 05	0.51	3.9	71.	61 8
240.	-207.	-0.13E 06	0.13E 06	0.19E 02	0.13E 06	0.97	6.5	79.	61 9
248.	-0.	-0.97E 02	0.97E 02	0.19E-01	0.97E 02	0.05	5.5	67.	61 10
240.	-7.	-0.41E 04	0.41E 04	0.26E 02	0.41E 04	0.43	4.5	79.	61 11
248.	-12.	-0.77E 04	0.79E 04	0.56E 02	0.78E 04	0.66	4.9	81.	61 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-28.	-0.21E 06	0.21E 06	0.29E 03	0.21E 06	0.55	4.5	76.	1961

STATION = 3 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-36.	-0.23E 05	0.23E 05	0.14E 02	0.23E 05	0.71	4.8	77.	62 1
224.	-27.	-0.15E 05	0.15E 05	0.44E 02	0.15E 05	0.94	4.7	78.	62 2
248.	-14.	-0.91E 04	0.92E 04	0.69E 02	0.92E 04	0.64	5.1	83.	62 3
240.	-10.	-0.61E 04	0.61E 04	0.27E 02	0.61E 04	0.62	4.2	77.	62 4
248.	-2.	-0.11E 04	0.11E 04	0.17E 01	0.11E 04	0.28	3.7	61.	62 5
240.	-4.	-0.23E 04	0.23E 04	0.73E 01	0.23E 04	0.34	3.8	73.	62 6
248.	-16.	-0.10E 05	0.10E 05	0.25E 01	0.10E 05	0.73	4.0	74.	62 7
248.	-9.	-0.60E 04	0.60E 04	0.	0.60E 04	0.50	4.3	75.	62 8
240.	-5.	-0.30E 04	0.30E 04	0.66E 01	0.30E 04	0.36	3.9	78.	62 9
248.	-23.	-0.14E 05	0.14E 05	0.95E 00	0.14E 05	0.43	4.4	76.	62 10
240.	-25.	-0.15E 05	0.15E 05	0.39E 02	0.15E 05	0.61	5.4	79.	62 11
248.	-11.	-0.69E 04	0.69E 04	0.23E 01	0.69E 04	0.44	4.4	74.	62 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-15.	-0.11E 06	0.11E 06	0.21E 03	0.11E 06	0.55	4.4	75.	1962

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-19.	-0.12E 05	0.12E 05	0.52E 02	0.12E 05	0.59	4.6	78.	63 1
224.	-20.	-0.12E 05	0.12E 05	0.36E 02	0.12E 05	0.67	5.0	77.	63 2
248.	-17.	-0.11E 05	0.11E 05	0.47E 02	0.11E 05	0.71	4.5	80.	63 3
240.	-34.	-0.21E 05	0.21E 05	0.36E 02	0.21E 05	0.85	4.3	76.	63 4
248.	-7.	-0.43E 04	0.43E 04	0.43E 00	0.43E 04	0.38	3.5	70.	63 5
240.	-29.	-0.18E 05	0.18E 05	0.11E 02	0.18E 05	0.92	3.9	76.	63 6
248.	-24.	-0.16E 05	0.16E 05	0.56E 01	0.16E 05	0.75	4.1	73.	63 7
248.	-10.	-0.65E 04	0.65E 04	0.31E 00	0.65E 04	0.58	4.3	67.	63 8
240.	-6.	-0.36E 04	0.36E 04	0.28E 01	0.36E 04	0.16	4.4	61.	63 9
248.	-1.	-0.35E 03	0.35E 03	0.	0.35E 03	0.05	5.1	55.	63 10
240.	-11.	-0.67E 04	0.67E 04	0.16E 02	0.67E 04	0.41	4.9	78.	63 11
248.	-8.	-0.52E 04	0.52E 04	0.15E 02	0.52E 04	0.46	4.7	76.	63 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-15.	-0.12E 06	0.12E 06	0.22E 03	0.12E 06	0.54	4.4	74.	1963

YEARLY SUMMARY

STATION = 3 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-13.	-0.83E 04	0.84E 04	0.50E 02	0.84E 04	0.69	4.9	80.	64 1
232.	-126.	-0.75E 05	0.75E 05	0.22E 02	0.75E 05	0.93	5.2	77.	64 2
248.	-27.	-0.17E 05	0.17E 05	0.74E 02	0.17E 05	0.81	5.3	83.	64 3
240.	-5.	-0.34E 04	0.35E 04	0.70E 02	0.34E 04	0.59	4.3	86.	64 4
248.	-5.	-0.32E 04	0.32E 04	0.20E 02	0.32E 04	0.36	3.8	69.	64 5
240.	-1.	-0.55E 03	0.55E 03	0.90E 00	0.55E 03	0.20	3.0	57.	64 6
248.	-53.	-0.34E 05	0.34E 05	0.17E 01	0.34E 05	1.05	4.2	77.	64 7
248.	-24.	-0.15E 05	0.15E 05	0.25E 02	0.15E 05	0.95	4.3	76.	64 8
240.	-2.	-0.14E 04	0.14E 04	0.23E 01	0.14E 04	0.20	4.5	73.	64 9
248.	-54.	-0.35E 05	0.35E 05	0.17E 02	0.35E 05	0.45	5.9	79.	64 10
240.	-12.	-0.71E 04	0.72E 04	0.21E 02	0.72E 04	0.44	4.3	74.	64 11
248.	-22.	-0.14E 05	0.14E 05	0.16E 02	0.14E 05	0.56	5.0	86.	64 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-28.	-0.21E 06	0.21E 06	0.32E 03	0.21E 06	0.60	4.5	77.	1964

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-121.	-0.77E 05	0.77E 05	0.20E 02	0.77E 05	0.88	5.2	76.	65 1
224.	-18.	-0.10E 05	0.10E 05	0.37E 02	0.10E 05	0.53	4.8	83.	65 2
248.	-14.	-0.92E 04	0.93E 04	0.47E 02	0.92E 04	0.68	4.8	80.	65 3
240.	-12.	-0.74E 04	0.75E 04	0.51E 02	0.75E 04	0.69	4.3	79.	65 4
248.	-0.	-0.28E 03	0.28E 03	0.74E 00	0.28E 03	0.16	3.5	63.	65 5
240.	-5.	-0.30E 04	0.31E 04	0.56E 02	0.31E 04	0.46	4.1	79.	65 6
248.	-14.	-0.92E 04	0.92E 04	0.47E 01	0.92E 04	0.79	3.7	77.	65 7
248.	-45.	-0.29E 05	0.29E 05	0.35E 01	0.29E 05	0.99	3.9	74.	65 8
240.	-24.	-0.15E 05	0.15E 05	0.45E 02	0.15E 05	0.65	5.2	85.	65 9
248.	-21.	-0.13E 05	0.13E 05	0.17E 02	0.13E 05	0.39	5.1	74.	65 10
240.	-48.	-0.30E 05	0.30E 05	0.16E 01	0.30E 05	0.77	4.9	79.	65 11
248.	-1.	-0.93E 03	0.95E 03	0.13E 02	0.94E 03	0.20	4.3	76.	65 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-27.	-0.20E 06	0.20E 06	0.30E 03	0.20E 06	0.60	4.4	77.	1965

STATION = 3 SZ DEPTH = BREAKING SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-7.	-0.42E 04	0.42E 04	0.14E 02	0.42E 04	0.34	5.0	75.	66 1
224.	-31.	-0.18E 05	0.18E 05	0.42E 02	0.18E 05	0.68	5.5	81.	66 2
248.	-11.	-0.69E 04	0.70E 04	0.18E 02	0.70E 04	0.50	4.7	74.	66 3
240.	-35.	-0.21E 05	0.21E 05	0.27E 02	0.21E 05	0.93	4.8	83.	66 4
248.	-27.	-0.17E 05	0.17E 05	0.12E 02	0.17E 05	0.82	4.2	76.	66 5
240.	-4.	-0.27E 04	0.27E 04	0.51E-01	0.27E 04	0.35	4.6	79.	66 6
248.	-11.	-0.73E 04	0.73E 04	0.16E 01	0.73E 04	0.55	3.7	65.	66 7
248.	-44.	-0.28E 05	0.28E 05	0.93E 01	0.28E 05	0.90	3.9	71.	66 8
240.	-24.	-0.15E 05	0.15E 05	0.37E 02	0.15E 05	0.84	4.2	75.	66 9
248.	-13.	-0.82E 04	0.82E 04	0.51E 00	0.82E 04	0.29	4.4	75.	66 10
240.	-16.	-0.10E 05	0.10E 05	0.17E 02	0.10E 05	0.44	4.8	80.	66 11
248.	-5.	-0.32E 04	0.32E 04	0.25E 02	0.32E 04	0.40	4.8	76.	66 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-19.	-0.14E 06	0.14E 06	0.20E 03	0.14E 06	0.59	4.5	75.	1966

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-6.	-0.36E 04	0.37E 04	0.62E 02	0.37E 04	0.47	5.0	82.	67 1
224.	-10.	-0.57E 04	0.58E 04	0.50E 02	0.58E 04	0.62	4.5	79.	67 2
248.	-17.	-0.11E 05	0.11E 05	0.36E 02	0.11E 05	0.57	4.4	79.	67 3
240.	-16.	-0.10E 05	0.10E 05	0.29E 02	0.10E 05	0.73	4.1	77.	67 4
248.	-67.	-0.43E 05	0.43E 05	0.28E 02	0.43E 05	1.16	4.3	75.	67 5
240.	-15.	-0.95E 04	0.95E 04	0.12E 01	0.95E 04	0.43	3.7	74.	67 6
248.	-28.	-0.18E 05	0.18E 05	0.29E 00	0.18E 05	0.87	4.1	74.	67 7
248.	-21.	-0.13E 05	0.13E 05	0.62E 01	0.13E 05	0.68	3.6	73.	67 8
240.	-2.	-0.13E 04	0.14E 04	0.11E 02	0.13E 04	0.25	4.3	69.	67 9
248.	-4.	-0.25E 04	0.25E 04	0.12E 02	0.25E 04	0.30	4.5	76.	67 10
240.	-180.	-0.11E 06	0.11E 06	0.	0.11E 06	1.14	5.0	73.	67 11
248.	-57.	-0.37E 05	0.37E 05	0.49E 02	0.37E 05	0.83	4.6	79.	67 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-35.	-0.27E 06	0.27E 06	0.28E 03	0.27E 06	0.67	4.3	76.	1967

STATION = 3 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 98.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-13.	-0.84E 04	0.84E 04	0.12E 02	0.84E 04	0.41	4.6	77.	68 1
232.	-24.	-0.15E 05	0.15E 05	0.46E 01	0.15E 05	0.59	5.1	73.	68 2
248.	-28.	-0.18E 05	0.18E 05	0.42E 02	0.18E 05	0.74	4.8	74.	68 3
240.	-22.	-0.14E 05	0.14E 05	0.10E 02	0.14E 05	0.74	4.1	76.	68 4
248.	-27.	-0.17E 05	0.17E 05	0.14E 01	0.17E 05	0.82	3.8	74.	68 5
240.	-24.	-0.15E 05	0.15E 05	0.57E 00	0.15E 05	0.76	4.9	71.	68 6
248.	-22.	-0.14E 05	0.14E 05	0.14E-01	0.14E 05	0.57	3.8	72.	68 7
248.	-7.	-0.45E 04	0.45E 04	0.31E 01	0.45E 04	0.42	4.0	66.	68 8
240.	-6.	-0.35E 04	0.36E 04	0.24E 02	0.36E 04	0.41	3.6	71.	68 9
248.	-2.	-0.15E 04	0.15E 04	0.58E 01	0.15E 04	0.20	4.4	68.	68 10
240.	-26.	-0.16E 05	0.16E 05	0.32E 02	0.16E 05	0.80	5.0	78.	68 11
248.	-29.	-0.18E 05	0.19E 05	0.26E 02	0.19E 05	0.79	5.0	79.	68 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-19.	-0.14E 06	0.15E 06	0.16E 03	0.14E 06	0.60	4.4	73.	1968

YEARLY SUMMARY

THIRTEEN YEAR SUMMARY

MEXICO BEACH ST = 3 SZ

SHORELINE ANGLE = 98.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

MEAN NET ENERGY FLUX = -24.

NET LONGSHORE TRANSPORT = -0.23E 07

NET TRANSPORT EASTERLY OR NORTHERLY

GROSS LONGSHORE TRANSPORT = 0.23E 07

NET LONGSHORE TRANSPORT RIGHT = 0.33E 04

NET LONGSHORE TRANSPORT LEFT = 0.23E 07

MEAN SIGNIFICANT HEIGHT = 0.61 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 76.1 DEGREES RELATIVE TO SHORE

D E F I N I T I O N S

TSUM = NUMBER OF OBSERVATIONS

PLS = MEAN ENERGY FLUX (FT LB/SEC/LIN FT)

Q NET = NET LONGSHORE TRANSPORT (CU YD/TIME)

Q GROSS = GROSS LONGSHORE TRANSPORT NO DIRECTION

Q RIGHT = NET TRANSPORT RATE TO WEST OR SOUTH

Q LEFT = NET TRANSPORT RATE TO EAST OR NORTH

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

STATION = 4 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-26.	-0.17E 05	0.19E 05	0.11E 04	0.18E 05	0.93	5.6	82.	56 1
232.	-2.	-0.11E 04	0.75E 04	0.32E 04	0.43E 04	1.05	4.7	88.	56 2
248.	-5.	-0.33E 04	0.59E 04	0.13E 04	0.46E 04	0.90	4.5	86.	56 3
240.	-2.	-0.95E 03	0.11E 05	0.49E 04	0.58E 04	1.10	4.8	84.	56 4
248.	-1.	-0.87E 03	0.12E 04	0.15E 03	0.10E 04	0.24	3.6	80.	56 5
240.	-8.	-0.50E 04	0.56E 04	0.32E 03	0.53E 04	0.60	3.7	73.	56 6
248.	-18.	-0.12E 05	0.14E 05	0.11E 04	0.13E 05	1.01	3.9	76.	56 7
248.	-11.	-0.69E 04	0.86E 04	0.86E 03	0.77E 04	0.98	4.5	81.	56 8
240.	3.	0.17E 04	0.30E 04	0.24E 04	0.63E 03	0.34	4.8	77.	56 9
248.	-9.	-0.60E 04	0.68E 04	0.39E 03	0.64E 04	0.38	4.4	84.	56 10
240.	-8.	-0.49E 04	0.50E 04	0.37E 02	0.49E 04	0.48	4.7	80.	56 11
248.	-6.	-0.39E 04	0.51E 04	0.57E 03	0.45E 04	0.60	4.8	83.	56 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-8.	-0.60E 05	0.92E 05	0.16E 05	0.76E 05	0.72	4.5	81.	1956

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-21.	-0.14E 05	0.16E 05	0.99E 03	0.15E 05	0.96	4.6	85.	57 1
224.	-23.	-0.13E 05	0.16E 05	0.15E 04	0.15E 05	0.88	4.7	84.	57 2
248.	-24.	-0.15E 05	0.18E 05	0.13E 04	0.17E 05	1.00	4.9	83.	57 3
240.	-7.	-0.46E 04	0.58E 04	0.63E 03	0.52E 04	0.45	5.0	90.	57 4
248.	-16.	-0.10E 05	0.13E 05	0.15E 04	0.12E 05	0.69	4.2	88.	57 5
240.	-1.	-0.70E 03	0.67E 04	0.30E 04	0.37E 04	0.72	4.5	88.	57 6
248.	-16.	-0.10E 05	0.11E 05	0.20E 03	0.10E 05	1.18	4.7	82.	57 7
248.	-24.	-0.16E 05	0.17E 05	0.54E 03	0.16E 05	0.89	4.7	77.	57 8
240.	6.	0.38E 04	0.57E 04	0.48E 04	0.92E 03	0.84	4.7	88.	57 9
248.	-3.	-0.17E 04	0.23E 04	0.31E 03	0.20E 04	0.30	4.4	80.	57 10
240.	-6.	-0.36E 04	0.52E 04	0.77E 03	0.44E 04	0.65	4.5	84.	57 11
248.	-6.	-0.36E 04	0.45E 04	0.42E 03	0.40E 04	0.53	5.1	84.	57 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-12.	-0.89E 05	0.12E 06	0.16E 05	0.10E 06	0.76	4.7	84.	1957

STATION = 4 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-36.	-0.23E 05	0.25E 05	0.12E 04	0.24E 05	0.95	5.7	83.	58 1
224.	-66.	-0.38E 05	0.49E 05	0.52E 04	0.43E 05	1.27	5.5	83.	58 2
248.	-21.	-0.14E 05	0.16E 05	0.11E 04	0.15E 05	0.82	4.8	84.	58 3
240.	-7.	-0.44E 04	0.68E 04	0.12E 04	0.56E 04	0.85	4.5	85.	58 4
248.	-2.	-0.13E 04	0.20E 04	0.34E 03	0.17E 04	0.27	4.0	83.	58 5
240.	-29.	-0.18E 05	0.19E 05	0.28E 03	0.18E 05	0.86	3.8	80.	58 6
248.	-5.	-0.29E 04	0.33E 04	0.19E 03	0.31E 04	0.46	3.5	82.	58 7
248.	-17.	-0.11E 05	0.11E 05	0.16E 03	0.11E 05	0.76	3.9	76.	58 8
240.	0.	-0.84E 02	0.14E 04	0.73E 03	0.65E 03	0.30	4.0	83.	58 9
248.	-0.	-0.63E 02	0.26E 03	0.10E 03	0.16E 03	0.10	4.2	73.	58 10
240.	-3.	-0.21E 04	0.27E 04	0.32E 03	0.24E 04	0.35	4.5	84.	58 11
248.	-36.	-0.23E 05	0.23E 05	0.44E 02	0.23E 05	0.54	5.0	77.	58 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-18.	-0.14E 06	0.16E 06	0.11E 05	0.15E 06	0.62	4.5	81.	1958

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-4.	-0.23E 04	0.41E 04	0.89E 03	0.32E 04	0.44	4.6	80.	59 1
224.	-35.	-0.20E 05	0.21E 05	0.78E 03	0.21E 05	0.73	4.6	87.	59 2
248.	-14.	-0.87E 04	0.10E 05	0.88E 03	0.96E 04	0.73	4.7	83.	59 3
240.	-9.	-0.56E 04	0.69E 04	0.67E 03	0.62E 04	0.71	4.4	85.	59 4
248.	-3.	-0.20E 04	0.30E 04	0.51E 03	0.25E 04	0.50	4.6	86.	59 5
240.	-6.	-0.34E 04	0.42E 04	0.43E 03	0.38E 04	0.71	4.1	83.	59 6
248.	-7.	-0.44E 04	0.50E 04	0.28E 03	0.47E 04	0.74	4.0	84.	59 7
248.	-27.	-0.17E 05	0.17E 05	0.10E 03	0.17E 05	0.74	4.5	77.	59 8
240.	-10.	-0.59E 04	0.85E 04	0.13E 04	0.72E 04	0.75	5.1	84.	59 9
248.	-10.	-0.64E 04	0.76E 04	0.61E 03	0.70E 04	0.65	4.7	85.	59 10
240.	-4.	-0.22E 04	0.28E 04	0.27E 03	0.25E 04	0.27	5.1	84.	59 11
248.	-7.	-0.45E 04	0.51E 04	0.29E 03	0.48E 04	0.49	5.2	83.	59 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-11.	-0.82E 05	0.96E 05	0.70E 04	0.89E 05	0.62	4.6	83.	1959

STATION = 4 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-9.	-0.60E 04	0.67E 04	0.36E 03	0.64E 04	0.70	4.8	81.	60 1
232.	0.	0.15E 03	0.16E 05	0.82E 04	0.80E 04	1.14	5.7	85.	60 2
248.	-7.	-0.42E 04	0.65E 04	0.11E 04	0.53E 04	0.69	4.9	84.	60 3
240.	-6.	-0.38E 04	0.45E 04	0.32E 03	0.41E 04	0.43	4.5	82.	60 4
248.	-4.	-0.27E 04	0.29E 04	0.97E 02	0.28E 04	0.36	3.5	77.	60 5
240.	-3.	-0.18E 04	0.21E 04	0.14E 03	0.19E 04	0.37	3.9	80.	60 6
248.	-10.	-0.65E 04	0.67E 04	0.97E 02	0.66E 04	0.91	4.1	82.	60 7
248.	-6.	-0.39E 04	0.50E 04	0.58E 03	0.45E 04	0.59	4.0	80.	60 8
240.	-1.	-0.80E 03	0.31E 04	0.12E 04	0.20E 04	0.48	5.0	87.	60 9
248.	-1.	-0.38E 03	0.21E 04	0.87E 03	0.12E 04	0.38	4.7	85.	60 10
240.	-0.	-0.18E 03	0.29E 03	0.54E 02	0.24E 03	0.12	4.5	80.	60 11
248.	-2.	-0.10E 04	0.14E 04	0.19E 03	0.12E 04	0.24	5.0	84.	60 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-4.	-0.31E 05	0.58E 05	0.13E 05	0.44E 05	0.53	4.5	82.	1960

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-19.	-0.12E 05	0.13E 05	0.11E 03	0.12E 05	0.69	5.3	79.	61 1
224.	-18.	-0.11E 05	0.12E 05	0.73E 03	0.11E 05	1.76	4.7	85.	61 2
248.	-3.	-0.20E 04	0.40E 04	0.10E 04	0.30E 04	0.68	4.4	86.	61 3
240.	-16.	-0.10E 05	0.11E 05	0.58E 03	0.11E 05	0.89	4.9	83.	61 4
248.	-2.	-0.14E 04	0.19E 04	0.23E 03	0.16E 04	0.40	3.8	81.	61 5
240.	0.	0.17E 03	0.11E 04	0.65E 03	0.48E 03	0.35	4.2	81.	61 6
248.	-0.	-0.30E 03	0.67E 03	0.18E 03	0.49E 03	0.21	3.0	73.	61 7
248.	-9.	-0.55E 04	0.64E 04	0.42E 03	0.60E 04	0.52	3.9	79.	61 8
240.	-89.	-0.55E 05	0.60E 05	0.25E 04	0.58E 05	0.95	6.5	86.	61 9
248.	-0.	-0.92E 02	0.93E 02	0.31E 00	0.93E 02	0.05	5.5	73.	61 10
240.	-4.	-0.24E 04	0.32E 04	0.42E 03	0.28E 04	0.44	4.5	84.	61 11
248.	-5.	-0.35E 04	0.56E 04	0.10E 04	0.45E 04	0.63	4.9	85.	61 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-14.	-0.10E 06	0.12E 06	0.79E 04	0.11E 06	0.54	4.5	82.	1961

STATION = 4 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-21.	-0.13E 05	0.14E 05	0.54E 03	0.14E 05	0.72	4.8	82.	62 1
224.	-12.	-0.67E 04	0.86E 04	0.95E 03	0.76E 04	0.93	4.7	83.	62 2
248.	-7.	-0.44E 04	0.73E 04	0.15E 04	0.58E 04	0.61	5.1	87.	62 3
240.	-5.	-0.28E 04	0.47E 04	0.96E 03	0.38E 04	0.62	4.2	82.	62 4
248.	-2.	-0.10E 04	0.12E 04	0.10E 03	0.11E 04	0.31	3.7	73.	62 5
240.	-2.	-0.97E 03	0.13E 04	0.15E 03	0.11E 04	0.35	3.8	82.	62 6
248.	-15.	-0.98E 04	0.99E 04	0.45E 02	0.98E 04	0.77	4.0	78.	62 7
248.	-8.	-0.52E 04	0.53E 04	0.46E 02	0.53E 04	0.55	4.3	79.	62 8
240.	-1.	-0.34E 03	0.14E 04	0.53E 03	0.86E 03	0.36	3.9	86.	62 9
248.	-13.	-0.86E 04	0.90E 04	0.18E 03	0.88E 04	0.43	4.4	82.	62 10
240.	-17.	-0.11E 05	0.12E 05	0.73E 03	0.11E 05	0.63	5.4	84.	62 11
248.	-9.	-0.55E 04	0.56E 04	0.65E 02	0.55E 04	0.46	4.4	79.	62 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-9.	-0.69E 05	0.81E 05	0.58E 04	0.75E 05	0.56	4.4	81.	1962

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-7.	-0.46E 04	0.75E 04	0.14E 04	0.61E 04	0.59	4.6	84.	63 1
224.	-10.	-0.58E 04	0.73E 04	0.76E 03	0.65E 04	0.67	5.0	82.	63 2
248.	-6.	-0.40E 04	0.58E 04	0.92E 03	0.49E 04	0.70	4.5	86.	63 3
240.	-22.	-0.14E 05	0.15E 05	0.86E 03	0.14E 05	0.87	4.3	81.	63 4
248.	-7.	-0.45E 04	0.48E 04	0.14E 03	0.46E 04	0.43	3.5	77.	63 5
240.	-11.	-0.66E 04	0.97E 04	0.15E 04	0.82E 04	0.96	3.9	81.	63 6
248.	-19.	-0.12E 05	0.13E 05	0.12E 03	0.12E 05	0.79	4.1	78.	63 7
248.	-9.	-0.58E 04	0.60E 04	0.78E 02	0.59E 04	0.64	4.3	74.	63 8
240.	1.	0.38E 03	0.73E 03	0.55E 03	0.18E 03	0.16	4.4	75.	63 9
248.	0.	0.73E 01	0.75E 02	0.41E 02	0.34E 02	0.05	5.1	64.	63 10
240.	-8.	-0.47E 04	0.51E 04	0.19E 03	0.49E 04	0.40	4.9	83.	63 11
248.	-5.	-0.31E 04	0.37E 04	0.30E 03	0.34E 04	0.48	4.7	80.	63 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-9.	-0.65E 05	0.78E 05	0.69E 04	0.72E 05	0.56	4.4	80.	1963

STATION = 4 S2 DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-4.	-0.27E 04	0.49E 04	0.11E 04	0.38E 04	0.70	4.9	85.	64 1
232.	-68.	-0.41E 05	0.41E 05	0.24E 03	0.41E 05	0.93	5.2	82.	64 2
248.	-7.	-0.48E 04	0.85E 04	0.19E 04	0.66E 04	0.79	5.3	88.	64 3
240.	-1.	-0.31E 03	0.23E 04	0.10E 04	0.13E 04	0.57	4.3	90.	64 4
248.	-4.	-0.26E 04	0.31E 04	0.25E 03	0.28E 04	0.36	3.8	76.	64 5
240.	-1.	-0.47E 03	0.61E 03	0.69E 02	0.54E 03	0.22	3.0	69.	64 6
248.	-32.	-0.20E 05	0.21E 05	0.64E 03	0.21E 05	1.07	4.2	82.	64 7
248.	-10.	-0.65E 04	0.80E 04	0.73E 03	0.73E 04	1.00	4.3	82.	64 8
240.	-1.	-0.86E 03	0.11E 04	0.12E 03	0.99E 03	0.19	4.5	81.	64 9
248.	-14.	-0.88E 04	0.17E 05	0.41E 04	0.13E 05	0.47	5.9	84.	64 10
240.	-1.	-0.91E 03	0.43E 04	0.17E 04	0.26E 04	0.46	4.3	80.	64 11
248.	4.	0.29E 04	0.36E 04	0.33E 04	0.39E 03	0.56	5.0	91.	64 12

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-11.	-0.86E 05	0.12E 06	0.15E 05	0.10E 06	0.61	4.5	83.	1964

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-64.	-0.41E 05	0.42E 05	0.63E 03	0.42E 05	0.89	5.2	82.	65 1
224.	-12.	-0.72E 04	0.86E 04	0.72E 03	0.79E 04	0.52	4.8	87.	65 2
248.	-9.	-0.57E 04	0.72E 04	0.77E 03	0.65E 04	0.69	4.8	85.	65 3
240.	-5.	-0.28E 04	0.45E 04	0.83E 03	0.37E 04	0.67	4.3	84.	65 4
248.	-0.	-0.25E 03	0.42E 03	0.84E 02	0.34E 03	0.17	3.5	72.	65 5
240.	-0.	-0.28E 03	0.23E 04	0.10E 04	0.13E 04	0.47	4.1	85.	65 6
248.	-11.	-0.68E 04	0.74E 04	0.31E 03	0.71E 04	0.81	3.7	81.	65 7
248.	-25.	-0.16E 05	0.18E 05	0.10E 04	0.17E 05	1.04	3.9	79.	65 8
240.	4.	0.24E 04	0.40E 04	0.32E 04	0.80E 03	0.65	5.2	90.	65 9
248.	-12.	-0.74E 04	0.83E 04	0.45E 03	0.78E 04	0.40	5.1	79.	65 10
240.	-15.	-0.92E 04	0.13E 05	0.20E 04	0.11E 05	0.78	4.9	85.	65 11
248.	-1.	-0.59E 03	0.96E 03	0.19E 03	0.77E 03	0.20	4.3	82.	65 12

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-13.	-0.95E 05	0.12E 06	0.11E 05	0.11E 06	0.61	4.4	82.	1965

STATION = 4 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-2.	-0.14E 04	0.22E 04	0.38E 03	0.18E 04	0.33	5.0	81.	66 1
224.	-5.	-0.31E 04	0.80E 04	0.24E 04	0.56E 04	0.67	5.5	86.	66 2
248.	-7.	-0.48E 04	0.55E 04	0.38E 03	0.51E 04	0.52	4.7	80.	66 3
240.	-21.	-0.13E 05	0.16E 05	0.14E 04	0.15E 05	0.94	4.8	88.	66 4
248.	-16.	-0.11E 05	0.12E 05	0.82E 03	0.11E 05	0.87	4.2	82.	66 5
240.	-2.	-0.14E 04	0.14E 04	0.31E 02	0.14E 04	0.35	4.6	83.	66 6
248.	-11.	-0.72E 04	0.76E 04	0.17E 03	0.74E 04	0.60	3.7	72.	66 7
248.	-24.	-0.15E 05	0.16E 05	0.33E 03	0.16E 05	0.89	3.9	79.	66 8
240.	-14.	-0.86E 04	0.11E 05	0.11E 04	0.98E 04	0.87	4.2	80.	66 9
248.	-7.	-0.42E 04	0.44E 04	0.98E 02	0.43E 04	0.30	4.4	83.	66 10
240.	-8.	-0.52E 04	0.63E 04	0.55E 03	0.57E 04	0.45	4.8	84.	66 11
248.	-3.	-0.18E 04	0.25E 04	0.36E 03	0.22E 04	0.39	4.8	82.	66 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-10.	-0.77E 05	0.93E 05	0.81E 04	0.85E 05	0.60	4.5	81.	1966

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-1.	-0.51E 03	0.29E 04	0.12E 04	0.17E 04	0.47	5.0	86.	67 1
224.	-2.	-0.12E 04	0.37E 04	0.13E 04	0.25E 04	0.62	4.5	85.	67 2
248.	-8.	-0.54E 04	0.69E 04	0.75E 03	0.61E 04	0.56	4.4	83.	67 3
240.	-9.	-0.58E 04	0.68E 04	0.50E 03	0.63E 04	0.75	4.1	82.	67 4
248.	-33.	-0.21E 05	0.24E 05	0.13E 04	0.23E 05	1.19	4.3	81.	67 5
240.	-14.	-0.88E 04	0.88E 04	0.37E 02	0.88E 04	0.46	3.7	77.	67 6
248.	-23.	-0.15E 05	0.15E 05	0.51E 02	0.15E 05	0.90	4.1	79.	67 7
248.	-16.	-0.10E 05	0.11E 05	0.36E 03	0.11E 05	0.71	3.6	79.	67 8
240.	-1.	-0.40E 03	0.93E 03	0.27E 03	0.67E 03	0.27	4.3	77.	67 9
248.	-3.	-0.17E 04	0.24E 04	0.33E 03	0.20E 04	0.31	4.5	82.	67 10
240.	-127.	-0.78E 05	0.78E 05	0.92E 02	0.78E 05	1.20	5.0	79.	67 11
248.	-19.	-0.12E 05	0.17E 05	0.26E 04	0.15E 05	0.84	4.6	86.	67 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-21.	-0.16E 06	0.18E 06	0.88E 04	0.17E 06	0.69	4.3	81.	1967

STATION = 4 SZ		DEPTH = BREAKING		SHORELINE ANGLE = 89.00							
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE		
248.	-10.	-0.61E 04	0.68E 04	0.36E 03	0.64E 04	0.42	4.6	82.	68	1	
232.	-13.	-0.79E 04	0.86E 04	0.34E 03	0.82E 04	0.60	5.1	79.	68	2	
248.	-10.	-0.65E 04	0.11E 05	0.21E 04	0.86E 04	0.75	4.8	81.	68	3	
240.	-18.	-0.11E 05	0.12E 05	0.54E 03	0.12E 05	0.76	4.1	80.	68	4	
248.	-21.	-0.13E 05	0.14E 05	0.51E 03	0.14E 05	0.87	3.8	78.	68	5	
240.	-20.	-0.12E 05	0.12E 05	0.35E 02	0.12E 05	0.79	4.9	76.	68	6	
248.	-18.	-0.11E 05	0.11E 05	0.75E 02	0.11E 05	0.62	3.8	78.	68	7	
248.	-6.	-0.41E 04	0.42E 04	0.74E 02	0.41E 04	0.44	4.0	74.	68	8	
240.	-3.	-0.19E 04	0.29E 04	0.50E 03	0.24E 04	0.42	3.6	78.	68	9	
248.	-2.	-0.11E 04	0.13E 04	0.65E 02	0.12E 04	0.21	4.4	75.	68	10	
240.	-6.	-0.36E 04	0.73E 04	0.18E 04	0.54E 04	0.81	5.0	83.	68	11	
248.	-12.	-0.78E 04	0.11E 05	0.17E 04	0.95E 04	0.80	5.0	84.	68	12	
YEARLY SUMMARY											
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE		
2928.	-12.	-0.87E 05	0.10E 06	0.82E 04	0.95E 05	0.62	4.4	79.	1968		

THIRTEEN YEAR SUMMARY

MEXICO BEACH ST = 4 SZ

SHORELINE ANGLE = 89.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

MEAN NET ENERGY FLUX = -12.

NET LONGSHORE TRANSPORT = -0.11E 07

NET TRANSPORT EASTERLY OR NORTHERLY

GROSS LONGSHORE TRANSPORT = 0.14E 07

NET LONGSHORE TRANSPORT RIGHT = 0.14E 06

NET LONGSHORE TRANSPORT LEFT = 0.13E 07

MEAN SIGNIFICANT HEIGHT = 0.62 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 81.6 DEGREES RELATIVE TO SHORE

D E F I N I T I O N S

TSUM = NUMBER OF OBSERVATIONS

PLS = MEAN ENERGY FLUX (FT LB/SEC/LIN FT)

Q NET = NET LONGSHORE TRANSPORT (CU YD/TIME)

Q GROSS = GROSS LONGSHORE TRANSPORT NO DIRECTION

Q RIGHT = NET TRANSPORT RATE TO WEST OR SOUTH

Q LEFT = NET TRANSPORT RATE TO EAST OR NORTH

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

STATION = 5 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-33.	-0.21E 05	0.22E 05	0.44E 03	0.21E 05	0.91	5.6	81.	56 1
232.	-6.	-0.38E 04	0.71E 04	0.16E 04	0.55E 04	1.03	4.7	87.	56 2
248.	-8.	-0.54E 04	0.75E 04	0.11E 04	0.64E 04	0.90	4.5	85.	56 3
240.	-7.	-0.42E 04	0.79E 04	0.19E 04	0.60E 04	1.05	4.8	82.	56 4
248.	-1.	-0.82E 03	0.11E 04	0.14E 03	0.96E 03	0.23	3.6	80.	56 5
240.	-9.	-0.57E 04	0.62E 04	0.24E 03	0.59E 04	0.60	3.7	73.	56 6
248.	-21.	-0.13E 05	0.14E 05	0.31E 03	0.13E 05	0.99	3.9	76.	56 7
248.	-12.	-0.77E 04	0.84E 04	0.31E 03	0.81E 04	0.96	4.5	80.	56 8
240.	1.	0.33E 03	0.17E 04	0.10E 04	0.70E 03	0.34	4.8	75.	56 9
248.	-10.	-0.62E 04	0.67E 04	0.21E 03	0.64E 04	0.37	4.4	83.	56 10
240.	-9.	-0.57E 04	0.57E 04	0.36E 02	0.57E 04	0.48	4.7	78.	56 11
248.	-8.	-0.51E 04	0.61E 04	0.51E 03	0.56E 04	0.60	4.8	82.	56 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-10.	-0.78E 05	0.94E 05	0.78E 04	0.86E 05	0.70	4.5	80.	1956

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-24.	-0.15E 05	0.16E 05	0.53E 03	0.16E 05	0.93	4.6	84.	57 1
224.	-26.	-0.15E 05	0.16E 05	0.75E 03	0.16E 05	0.87	4.7	83.	57 2
248.	-33.	-0.21E 05	0.23E 05	0.69E 03	0.22E 05	0.98	4.9	82.	57 3
240.	-10.	-0.64E 04	0.73E 04	0.48E 03	0.69E 04	0.45	5.0	89.	57 4
248.	-18.	-0.12E 05	0.13E 05	0.64E 03	0.12E 05	0.64	4.2	88.	57 5
240.	-5.	-0.29E 04	0.58E 04	0.15E 04	0.43E 04	0.72	4.5	87.	57 6
248.	-19.	-0.12E 05	0.12E 05	0.64E 01	0.12E 05	1.15	4.7	81.	57 7
248.	-29.	-0.18E 05	0.19E 05	0.24E 03	0.19E 05	0.91	4.7	76.	57 8
240.	2.	0.15E 04	0.33E 04	0.24E 04	0.91E 03	0.80	4.7	87.	57 9
248.	-3.	-0.19E 04	0.24E 04	0.26E 03	0.22E 04	0.30	4.4	79.	57 10
240.	-6.	-0.39E 04	0.52E 04	0.64E 03	0.46E 04	0.64	4.5	83.	57 11
248.	-7.	-0.44E 04	0.50E 04	0.33E 03	0.47E 04	0.52	5.1	82.	57 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-15.	-0.11E 06	0.13E 06	0.84E 04	0.12E 06	0.74	4.7	83.	1957

STATION = 5 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-52.	-0.33E 05	0.34E 05	0.57E 03	0.34E 05	0.98	5.7	81.	58 1
224.	-112.	-0.64E 05	0.69E 05	0.23E 04	0.67E 05	1.29	5.5	81.	58 2
248.	-26.	-0.17E 05	0.18E 05	0.82E 03	0.18E 05	0.81	4.8	83.	58 3
240.	-9.	-0.55E 04	0.75E 04	0.10E 04	0.65E 04	0.84	4.5	84.	58 4
248.	-2.	-0.12E 04	0.17E 04	0.29E 03	0.14E 04	0.26	4.0	82.	58 5
240.	-36.	-0.22E 05	0.23E 05	0.16E 03	0.23E 05	0.87	3.8	79.	58 6
248.	-5.	-0.34E 04	0.38E 04	0.19E 03	0.36E 04	0.46	3.5	82.	58 7
240.	-21.	-0.14E 05	0.14E 05	0.13E 03	0.14E 05	0.77	3.9	75.	58 8
240.	0.	0.47E 02	0.13E 04	0.68E 03	0.63E 03	0.29	4.0	82.	58 9
248.	-0.	-0.11E 03	0.32E 03	0.10E 03	0.22E 03	0.11	4.2	71.	58 10
240.	-3.	-0.17E 04	0.23E 04	0.27E 03	0.20E 04	0.34	4.5	83.	58 11
248.	-37.	-0.24E 05	0.24E 05	0.74E 01	0.24E 05	0.51	5.0	75.	58 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-25.	-0.19E 06	0.20E 06	0.65E 04	0.19E 06	0.62	4.5	80.	1958

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-6.	-0.36E 04	0.45E 04	0.45E 03	0.40E 04	0.42	4.6	78.	59 1
224.	-40.	-0.23E 05	0.24E 05	0.52E 03	0.23E 05	0.71	4.6	86.	59 2
248.	-18.	-0.11E 05	0.12E 05	0.48E 03	0.12E 05	0.72	4.7	83.	59 3
240.	-10.	-0.63E 04	0.75E 04	0.58E 03	0.69E 04	0.71	4.4	84.	59 4
248.	-4.	-0.23E 04	0.31E 04	0.35E 03	0.27E 04	0.50	4.6	85.	59 5
240.	-7.	-0.44E 04	0.50E 04	0.31E 03	0.47E 04	0.72	4.1	82.	59 6
248.	-9.	-0.55E 04	0.57E 04	0.11E 03	0.56E 04	0.73	4.0	83.	59 7
248.	-29.	-0.19E 05	0.19E 05	0.55E 02	0.19E 05	0.72	4.5	76.	59 8
240.	-17.	-0.10E 05	0.12E 05	0.65E 03	0.11E 05	0.78	5.1	82.	59 9
248.	-14.	-0.92E 04	0.10E 05	0.46E 03	0.97E 04	0.65	4.7	84.	59 10
240.	-6.	-0.35E 04	0.40E 04	0.22E 03	0.37E 04	0.28	5.1	82.	59 11
248.	-10.	-0.65E 04	0.68E 04	0.17E 03	0.67E 04	0.49	5.2	81.	59 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-14.	-0.10E 06	0.11E 06	0.44E 04	0.11E 06	0.62	4.6	82.	1959

STATION = 5 S2. DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-13.	-0.81E 04	0.85E 04	0.18E 03	0.83E 04	0.70	4.8	80.	60 1
248.	-11.	-0.68E 04	0.13E 05	0.31E 04	0.99E 04	1.13	5.7	83.	60 2
248.	-9.	-0.57E 04	0.67E 04	0.47E 03	0.62E 04	0.67	4.9	83.	60 3
248.	-7.	-0.44E 04	0.49E 04	0.25E 03	0.47E 04	0.42	4.5	81.	60 4
248.	-5.	-0.29E 04	0.30E 04	0.81E 02	0.30E 04	0.35	3.5	76.	60 5
248.	-3.	-0.18E 04	0.21E 04	0.21E 03	0.20E 04	0.36	3.9	78.	60 6
248.	-11.	-0.72E 04	0.74E 04	0.94E 02	0.73E 04	0.90	4.1	82.	60 7
248.	-7.	-0.42E 04	0.49E 04	0.36E 03	0.45E 04	0.60	4.0	79.	60 8
240.	-2.	-0.15E 04	0.27E 04	0.58E 03	0.21E 04	0.46	5.0	86.	60 9
240.	-1.	-0.81E 03	0.16E 04	0.41E 03	0.12E 04	0.36	4.7	84.	60 10
240.	-0.	-0.18E 03	0.29E 03	0.58E 02	0.24E 03	0.12	4.5	78.	60 11
248.	-2.	-0.11E 04	0.14E 04	0.14E 03	0.12E 04	0.23	5.0	83.	60 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-6.	-0.45E 05	0.56E 05	0.58E 04	0.51E 05	0.53	4.5	81.	1960

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-26.	-0.17E 05	0.17E 05	0.63E 02	0.17E 05	0.70	5.3	77.	61 1
224.	-20.	-0.12E 05	0.12E 05	0.44E 03	0.12E 05	0.72	4.7	85.	61 2
248.	-4.	-0.22E 04	0.39E 04	0.84E 03	0.31E 04	0.65	4.4	85.	61 3
240.	-22.	-0.14E 05	0.14E 05	0.43E 03	0.14E 05	0.88	4.9	82.	61 4
248.	-2.	-0.16E 04	0.20E 04	0.21E 03	0.18E 04	0.40	3.8	80.	61 5
240.	-0.	-0.41E 02	0.86E 03	0.41E 03	0.45E 03	0.35	4.2	80.	61 6
248.	-1.	-0.37E 03	0.64E 03	0.14E 03	0.51E 03	0.21	3.0	72.	61 7
248.	-12.	-0.74E 04	0.79E 04	0.21E 03	0.76E 04	0.52	3.9	78.	61 8
240.	-107.	-0.66E 05	0.68E 05	0.11E 04	0.67E 05	0.93	6.5	85.	61 9
248.	-0.	-0.67E 02	0.68E 02	0.22E 00	0.68E 02	0.04	5.5	69.	61 10
240.	-4.	-0.26E 04	0.34E 04	0.36E 03	0.30E 04	0.42	4.5	83.	61 11
248.	-6.	-0.40E 04	0.55E 04	0.78E 03	0.48E 04	0.62	4.9	84.	61 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-17.	-0.13E 06	0.14E 06	0.50E 04	0.13E 06	0.54	4.5	81.	1961

STATION = 5 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-28.	-0.18E 05	0.18E 05	0.28E 03	0.18E 05	0.73	4.8	81.	62 1
224.	-16.	-0.90E 04	0.10E 05	0.65E 03	0.97E 04	0.94	4.7	82.	62 2
248.	-8.	-0.52E 04	0.69E 04	0.85E 03	0.60E 04	0.61	5.1	85.	62 3
240.	-6.	-0.36E 04	0.49E 04	0.68E 03	0.42E 04	0.59	4.2	81.	62 4
248.	-2.	-0.10E 04	0.11E 04	0.69E 02	0.11E 04	0.30	3.7	71.	62 5
240.	-2.	-0.98E 03	0.11E 04	0.69E 02	0.10E 04	0.33	3.8	82.	62 6
248.	-16.	-0.10E 05	0.10E 05	0.26E 02	0.10E 05	0.76	4.0	77.	62 7
248.	-9.	-0.56E 04	0.56E 04	0.87E 01	0.56E 04	0.53	4.3	78.	62 8
240.	-1.	-0.63E 03	0.14E 04	0.39E 03	0.10E 04	0.36	3.9	85.	62 9
248.	-19.	-0.12E 05	0.13E 05	0.17E 03	0.12E 05	0.44	4.4	81.	62 10
240.	-18.	-0.11E 05	0.12E 05	0.51E 03	0.11E 05	0.62	5.4	83.	62 11
248.	-9.	-0.56E 04	0.57E 04	0.49E 02	0.56E 04	0.45	4.4	78.	62 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-11.	-0.83E 05	0.90E 05	0.37E 04	0.87E 05	0.55	4.4	80.	1962

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-9.	-0.58E 04	0.74E 04	0.79E 03	0.66E 04	0.58	4.6	82.	63 1
224.	-12.	-0.70E 04	0.79E 04	0.44E 03	0.75E 04	0.64	5.0	80.	63 2
248.	-9.	-0.58E 04	0.72E 04	0.67E 03	0.65E 04	0.70	4.5	84.	63 3
240.	-28.	-0.17E 05	0.19E 05	0.65E 03	0.18E 05	0.88	4.3	80.	63 4
248.	-8.	-0.49E 04	0.52E 04	0.13E 03	0.51E 04	0.44	3.5	76.	63 5
240.	-14.	-0.88E 04	0.10E 05	0.78E 03	0.96E 04	0.97	3.9	81.	63 6
248.	-24.	-0.15E 05	0.15E 05	0.47E 02	0.15E 05	0.81	4.1	77.	63 7
248.	-10.	-0.61E 04	0.62E 04	0.51E 02	0.61E 04	0.62	4.3	73.	63 8
240.	0.	0.11E 03	0.42E 03	0.26E 03	0.16E 03	0.16	4.4	74.	63 9
248.	-0.	-0.29E 02	0.58E 02	0.15E 02	0.44E 02	0.05	5.1	59.	63 10
240.	-7.	-0.45E 04	0.47E 04	0.12E 03	0.46E 04	0.38	4.9	81.	63 11
248.	-5.	-0.33E 04	0.37E 04	0.21E 03	0.35E 04	0.46	4.7	79.	63 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-10.	-0.79E 05	0.87E 05	0.42E 04	0.83E 05	0.56	4.4	79.	1963

STATION = 5 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-6.	-0.38E 04	0.50E 04	0.60E 03	0.44E 04	0.68	4.9	84.	64 1
232.	-90.	-0.54E 05	0.54E 05	0.20E 03	0.54E 05	0.93	5.2	81.	64 2
248.	-12.	-0.77E 04	0.10E 05	0.11E 04	0.89E 04	0.80	5.3	87.	64 3
240.	-2.	-0.11E 04	0.25E 04	0.71E 03	0.18E 04	0.55	4.3	90.	64 4
248.	-4.	-0.25E 04	0.28E 04	0.17E 03	0.27E 04	0.36	3.8	74.	64 5
240.	-1.	-0.40E 03	0.50E 03	0.54E 02	0.45E 03	0.21	3.0	68.	64 6
248.	-37.	-0.24E 05	0.24E 05	0.30E 03	0.24E 05	1.09	4.2	81.	64 7
248.	-11.	-0.71E 04	0.80E 04	0.47E 03	0.76E 04	0.98	4.3	81.	64 8
240.	-1.	-0.90E 03	0.11E 04	0.87E 02	0.99E 03	0.19	4.5	79.	64 9
248.	-22.	-0.14E 05	0.17E 05	0.15E 04	0.16E 05	0.45	5.9	82.	64 10
240.	-4.	-0.22E 04	0.37E 04	0.75E 03	0.30E 04	0.44	4.3	79.	64 11
248.	2.	0.10E 04	0.18E 04	0.14E 04	0.40E 03	0.55	5.0	91.	64 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-15.	-0.12E 06	0.13E 06	0.74E 04	0.12E 06	0.60	4.5	82.	1964

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-83.	-0.53E 05	0.54E 05	0.32E 03	0.53E 05	0.92	5.2	80.	65 1
224.	-12.	-0.68E 04	0.79E 04	0.55E 03	0.73E 04	0.51	4.8	86.	65 2
248.	-11.	-0.73E 04	0.85E 04	0.60E 03	0.79E 04	0.68	4.8	85.	65 3
240.	-6.	-0.39E 04	0.50E 04	0.55E 03	0.45E 04	0.67	4.3	83.	65 4
248.	-0.	-0.20E 03	0.36E 03	0.80E 02	0.28E 03	0.17	3.5	70.	65 5
240.	-1.	-0.65E 03	0.22E 04	0.76E 03	0.14E 04	0.46	4.1	84.	65 6
248.	-12.	-0.75E 04	0.80E 04	0.27E 03	0.77E 04	0.82	3.7	81.	65 7
248.	-30.	-0.19E 05	0.20E 05	0.47E 03	0.19E 05	1.04	3.9	79.	65 8
240.	0.	0.26E 03	0.21E 04	0.12E 04	0.94E 03	0.61	5.2	89.	65 9
248.	-16.	-0.10E 05	0.11E 05	0.27E 03	0.10E 05	0.41	5.1	77.	65 10
240.	-24.	-0.15E 05	0.16E 05	0.68E 03	0.16E 05	0.78	4.9	84.	65 11
248.	-1.	-0.56E 03	0.88E 03	0.16E 03	0.72E 03	0.20	4.3	81.	65 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-16.	-0.12E 06	0.14E 06	0.59E 04	0.13E 06	0.61	4.4	82.	1965

STATION = 5 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-4.	-0.23E 04	0.28E 04	0.27E 03	0.25E 04	0.33	5.0	78.	66 1
224.	-6.	-0.33E 04	0.57E 04	0.12E 04	0.45E 04	0.65	5.5	84.	66 2
248.	-8.	-0.52E 04	0.57E 04	0.28E 03	0.55E 04	0.50	4.7	78.	66 3
240.	-21.	-0.13E 05	0.15E 05	0.87E 03	0.14E 05	0.94	4.8	87.	66 4
248.	-20.	-0.13E 05	0.14E 05	0.51E 03	0.13E 05	0.88	4.2	81.	66 5
240.	-2.	-0.14E 04	0.14E 04	0.12E 01	0.14E 04	0.33	4.6	83.	66 6
248.	-12.	-0.78E 04	0.81E 04	0.12E 03	0.79E 04	0.60	3.7	71.	66 7
248.	-34.	-0.22E 05	0.22E 05	0.20E 03	0.22E 05	0.94	3.9	77.	66 8
240.	-17.	-0.10E 05	0.11E 05	0.56E 03	0.11E 05	0.84	4.2	79.	66 9
248.	-8.	-0.54E 04	0.54E 04	0.46E 02	0.54E 04	0.31	4.4	82.	66 10
240.	-10.	-0.60E 04	0.65E 04	0.24E 03	0.62E 04	0.43	4.8	83.	66 11
248.	-3.	-0.20E 04	0.26E 04	0.30E 03	0.23E 04	0.38	4.8	80.	66 12

## YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-12.	-0.91E 05	0.10E 06	0.46E 04	0.96E 05	0.59	4.5	80.	1966

A-114

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-2.	-0.13E 04	0.27E 04	0.68E 03	0.20E 04	0.45	5.0	85.	67 1
224.	-3.	-0.15E 04	0.33E 04	0.92E 03	0.24E 04	0.60	4.5	84.	67 2
248.	-12.	-0.76E 04	0.84E 04	0.40E 03	0.80E 04	0.56	4.4	82.	67 3
240.	-11.	-0.67E 04	0.75E 04	0.39E 03	0.71E 04	0.73	4.1	81.	67 4
248.	-45.	-0.28E 05	0.30E 05	0.58E 03	0.29E 05	1.19	4.3	81.	67 5
240.	-14.	-0.89E 04	0.89E 04	0.23E 02	0.89E 04	0.46	3.7	76.	67 6
248.	-26.	-0.16E 05	0.17E 05	0.44E 02	0.17E 05	0.93	4.1	78.	67 7
248.	-18.	-0.12E 05	0.12E 05	0.31E 03	0.12E 05	0.71	3.6	78.	67 8
240.	-1.	-0.70E 03	0.10E 04	0.16E 03	0.86E 03	0.26	4.3	76.	67 9
248.	-2.	-0.15E 04	0.20E 04	0.26E 03	0.17E 04	0.28	4.5	81.	67 10
240.	-143.	-0.88E 05	0.88E 05	0.42E 02	0.88E 05	1.20	5.0	78.	67 11
248.	-24.	-0.15E 05	0.18E 05	0.15E 04	0.17E 05	0.83	4.6	85.	67 12

## YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-25.	-0.19E 06	0.20E 06	0.53E 04	0.19E 06	0.68	4.3	80.	1967

STATION = 5 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 89.00

ISUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-11.	-0.70E 04	0.76E 04	0.29E 03	0.73E 04	0.41	4.6	81.	68 1
232.	-18.	-0.10E 05	0.11E 05	0.13E 03	0.11E 05	0.58	5.1	77.	68 2
248.	-11.	-0.72E 04	0.93E 04	0.10E 04	0.82E 04	0.73	4.8	79.	68 3
240.	-20.	-0.13E 05	0.14E 05	0.53E 03	0.13E 05	0.76	4.1	79.	68 4
248.	-23.	-0.14E 05	0.15E 05	0.43E 03	0.15E 05	0.87	3.8	78.	68 5
240.	-25.	-0.15E 05	0.15E 05	0.30E 02	0.15E 05	0.84	4.9	75.	68 6
248.	-20.	-0.13E 05	0.13E 05	0.46E 02	0.13E 05	0.62	3.8	77.	68 7
248.	-6.	-0.39E 04	0.40E 04	0.50E 02	0.39E 04	0.43	4.0	74.	68 8
240.	-3.	-0.19E 04	0.27E 04	0.38E 03	0.23E 04	0.40	3.6	78.	68 9
248.	-2.	-0.11E 04	0.12E 04	0.56E 02	0.11E 04	0.20	4.4	72.	68 10
240.	-8.	-0.52E 04	0.65E 04	0.64E 03	0.58E 04	0.77	5.0	82.	68 11
248.	-17.	-0.11E 05	0.12E 05	0.70E 03	0.12E 05	0.78	5.0	82.	68 12

YEARLY SUMMARY

ISUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-14.	-0.10E 06	0.11E 06	0.43E 04	0.11E 06	0.61	4.4	78.	1968

THIRTEEN YEAR SUMMARY

MEXICO BEACH ST = 5 SZ

SHORELINE ANGLE = 89.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

MEAN NET ENERGY FLUX = -15.

NET LONGSHORE TRANSPORT = -0.14E 07

NET TRANSPORT EASTERLY OR NORTHERLY

GROSS LONGSHORE TRANSPORT = 0.16E 07

NET LONGSHORE TRANSPORT RIGHT = 0.73E 05

NET LONGSHORE TRANSPORT LEFT = 0.15E 07

MEAN SIGNIFICANT HEIGHT = 0.61 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 80.6 DEGREES RELATIVE TO SHORE

D E F I N I T I O N S

TSUM = NUMBER OF OBSERVATIONS

PLS = MEAN ENERGY FLUX (FT LB/SEC/LIN FT)

Q NET = NET LONGSHORE TRANSPORT (CU YD/TIME)

Q GROSS = GROSS LONGSHORE TRANSPORT NO DIRECTION

Q RIGHT = NET TRANSPORT RATE TO WEST OR SOUTH

Q LEFT = NET TRANSPORT RATE TO EAST OR NORTH

H MEAN = MEAN SIGNIFICANT HEIGHT IN FEET

AVPER = MEAN PEAK PERIOD IN SECONDS

AVANG = MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH

STATION = 6 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-37.	-0.23E 05	0.24E 05	0.27E 03	0.24E 05	0.89	5.6	80.	56 1
232.	-8.	-0.49E 04	0.76E 04	0.13E 04	0.62E 04	1.01	4.7	87.	56 2
248.	-10.	-0.61E 04	0.79E 04	0.93E 03	0.70E 04	0.87	4.5	84.	56 3
240.	-10.	-0.61E 04	0.90E 04	0.15E 04	0.76E 04	1.01	4.8	82.	56 4
248.	-1.	-0.82E 03	0.12E 04	0.18E 03	0.10E 04	0.24	3.6	79.	56 5
240.	-8.	-0.47E 04	0.51E 04	0.22E 03	0.49E 04	0.58	3.7	73.	56 6
248.	-23.	-0.14E 05	0.15E 05	0.39E 03	0.15E 05	0.99	3.9	76.	56 7
248.	-13.	-0.80E 04	0.85E 04	0.24E 03	0.83E 04	0.97	4.5	80.	56 8
240.	1.	0.36E 03	0.15E 04	0.94E 03	0.58E 03	0.33	4.8	75.	56 9
248.	-12.	-0.79E 04	0.84E 04	0.24E 03	0.81E 04	0.38	4.7	82.	56 10
240.	-9.	-0.55E 04	0.56E 04	0.31E 02	0.56E 04	0.48	4.4	78.	56 11
248.	-11.	-0.68E 04	0.78E 04	0.46E 03	0.73E 04	0.61	4.8	81.	56 12

YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-12.	-0.88E 05	0.10E 06	0.67E 04	0.95E 05	0.70	4.5	80.	1956

A-118

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-22.	-0.14E 05	0.15E 05	0.46E 03	0.14E 05	0.93	4.6	84.	57 1
224.	-28.	-0.16E 05	0.17E 05	0.51E 03	0.16E 05	0.86	4.7	83.	57 2
248.	-31.	-0.20E 05	0.21E 05	0.57E 03	0.20E 05	0.97	4.9	82.	57 3
240.	-11.	-0.71E 04	0.77E 04	0.34E 03	0.74E 04	0.45	5.0	88.	57 4
248.	-13.	-0.81E 04	0.95E 04	0.69E 03	0.88E 04	0.64	4.2	88.	57 5
240.	-6.	-0.35E 04	0.54E 04	0.93E 03	0.45E 04	0.66	4.5	87.	57 6
248.	-18.	-0.12E 05	0.12E 05	0.88E 01	0.12E 05	1.16	4.7	81.	57 7
248.	-31.	-0.20E 05	0.20E 05	0.22E 03	0.20E 05	0.90	4.7	76.	57 8
240.	1.	0.81E 03	0.28E 04	0.18E 04	0.98E 03	0.76	4.7	87.	57 9
248.	-3.	-0.19E 04	0.25E 04	0.28E 03	0.22E 04	0.30	4.4	78.	57 10
240.	-7.	-0.43E 04	0.55E 04	0.58E 03	0.49E 04	0.62	4.5	82.	57 11
248.	-7.	-0.48E 04	0.52E 04	0.22E 03	0.50E 04	0.51	5.1	82.	57 12

YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-15.	-0.11E 06	0.12E 06	0.66E 04	0.12E 06	0.73	4.7	83.	1957

STATION = 6 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-49.	-0.31E 05	0.32E 05	0.47E 03	0.32E 05	0.97	5.7	80.	58 1
224.	-132.	-0.76E 05	0.79E 05	0.18E 04	0.78E 05	1.27	5.5	80.	58 2
248.	-23.	-0.14E 05	0.16E 05	0.58E 03	0.15E 05	0.78	4.8	82.	58 3
240.	-8.	-0.51E 04	0.69E 04	0.90E 03	0.60E 04	0.83	4.5	83.	58 4
248.	-2.	-0.13E 04	0.19E 04	0.31E 03	0.16E 04	0.26	4.0	81.	58 5
240.	-38.	-0.23E 05	0.24E 05	0.18E 03	0.23E 05	0.89	3.8	79.	58 6
248.	-5.	-0.33E 04	0.35E 04	0.14E 03	0.34E 04	0.45	3.5	81.	58 7
240.	-22.	-0.14E 05	0.14E 05	0.10E 03	0.14E 05	0.75	3.9	75.	58 8
240.	0.	0.88E 02	0.12E 04	0.64E 03	0.55E 03	0.29	4.0	82.	58 9
248.	-0.	-0.14E 03	0.33E 03	0.98E 02	0.24E 03	0.10	4.2	70.	58 10
240.	-3.	-0.17E 04	0.21E 04	0.23E 03	0.19E 04	0.33	4.5	83.	58 11
248.	-33.	-0.21E 05	0.21E 05	0.84E 01	0.21E 05	0.51	5.0	74.	58 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-26.	-0.19E 06	0.20E 06	0.54E 04	0.20E 06	0.61	4.5	80.	1958

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-5.	-0.29E 04	0.37E 04	0.38E 03	0.33E 04	0.42	4.6	77.	59 1
224.	-40.	-0.23E 05	0.24E 05	0.52E 03	0.23E 05	0.72	4.6	86.	59 2
248.	-16.	-0.10E 05	0.11E 05	0.41E 03	0.11E 05	0.70	4.7	82.	59 3
240.	-11.	-0.70E 04	0.80E 04	0.49E 03	0.75E 04	0.70	4.4	83.	59 4
248.	-3.	-0.19E 04	0.25E 04	0.29E 03	0.22E 04	0.44	4.6	85.	59 5
240.	-7.	-0.41E 04	0.46E 04	0.24E 03	0.44E 04	0.70	4.1	82.	59 6
248.	-8.	-0.52E 04	0.55E 04	0.12E 03	0.54E 04	0.72	4.0	83.	59 7
240.	-33.	-0.21E 05	0.21E 05	0.70E 02	0.21E 05	0.74	4.5	76.	59 8
240.	-21.	-0.13E 05	0.14E 05	0.57E 03	0.14E 05	0.80	5.1	82.	59 9
248.	-15.	-0.98E 04	0.11E 05	0.43E 03	0.10E 05	0.65	4.7	84.	59 10
240.	-5.	-0.31E 04	0.34E 04	0.19E 03	0.32E 04	0.28	5.1	81.	59 11
248.	-9.	-0.55E 04	0.58E 04	0.17E 03	0.56E 04	0.46	5.2	80.	59 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-14.	-0.11E 06	0.11E 06	0.39E 04	0.11E 06	0.61	4.6	82.	1959

STATION = 6 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-17.	-0.11E 05	0.11E 05	0.15E 03	0.11E 05	0.71	4.8	79.	60 1
232.	-15.	-0.92E 04	0.15E 05	0.30E 04	0.12E 05	1.11	5.7	83.	60 2
248.	-9.	-0.58E 04	0.64E 04	0.31E 03	0.61E 04	0.64	4.9	83.	60 3
240.	-8.	-0.52E 04	0.58E 04	0.26E 03	0.55E 04	0.43	4.5	81.	60 4
248.	-4.	-0.26E 04	0.28E 04	0.85E 02	0.27E 04	0.35	3.5	76.	60 5
240.	-3.	-0.20E 04	0.22E 04	0.14E 03	0.21E 04	0.37	3.9	78.	60 6
248.	-10.	-0.66E 04	0.67E 04	0.68E 02	0.67E 04	0.87	4.1	81.	60 7
248.	-7.	-0.48E 04	0.53E 04	0.28E 03	0.50E 04	0.60	4.0	79.	60 8
240.	-3.	-0.16E 04	0.26E 04	0.51E 03	0.21E 04	0.45	5.0	86.	60 9
248.	-2.	-0.10E 04	0.17E 04	0.33E 03	0.14E 04	0.35	4.7	84.	60 10
240.	-0.	-0.15E 03	0.27E 03	0.59E 02	0.21E 03	0.12	4.5	77.	60 11
248.	-1.	-0.85E 03	0.11E 04	0.12E 03	0.97E 03	0.22	5.0	82.	60 12

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-7.	-0.50E 05	0.61E 05	0.53E 04	0.56E 05	0.52	4.5	80.	1960

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-37.	-0.24E 05	0.24E 05	0.72E 02	0.24E 05	0.73	5.3	76.	61 1
224.	-24.	-0.14E 05	0.15E 05	0.40E 03	0.14E 05	0.71	4.7	84.	61 2
248.	-3.	-0.19E 04	0.32E 04	0.67E 03	0.26E 04	0.62	4.4	85.	61 3
240.	-18.	-0.11E 05	0.12E 05	0.39E 03	0.12E 05	0.84	4.9	82.	61 4
248.	-2.	-0.13E 04	0.17E 04	0.20E 03	0.15E 04	0.40	3.8	79.	61 5
240.	-0.	-0.18E 03	0.72E 03	0.27E 03	0.45E 03	0.35	4.2	80.	61 6
248.	-0.	-0.23E 03	0.59E 03	0.18E 03	0.41E 03	0.22	3.0	72.	61 7
248.	-12.	-0.77E 04	0.80E 04	0.15E 03	0.78E 04	0.51	3.9	79.	61 8
240.	-84.	-0.52E 05	0.54E 05	0.93E 03	0.53E 05	0.91	6.5	85.	61 9
248.	-0.	-0.82E 02	0.83E 02	0.16E 00	0.82E 02	0.05	5.5	66.	61 10
240.	-4.	-0.27E 04	0.33E 04	0.30E 03	0.20E 04	0.41	4.5	83.	61 11
248.	-7.	-0.42E 04	0.54E 04	0.61E 03	0.48E 04	0.60	4.9	84.	61 12

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-16.	-0.12E 06	0.13E 06	0.42E 04	0.12E 06	0.53	4.5	81.	1961

STATION = 6 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-30.	-0.19E 05	0.19E 05	0.21E 03	0.19E 05	0.71	4.8	80.	62 1
224.	-18.	-0.10E 05	0.12E 05	0.65E 03	0.11E 05	0.95	4.7	80.	62 2
248.	-9.	-0.55E 04	0.66E 04	0.59E 03	0.60E 04	0.60	5.1	85.	62 3
240.	-6.	-0.37E 04	0.50E 04	0.64E 03	0.44E 04	0.59	4.2	81.	62 4
248.	-2.	-0.97E 03	0.10E 04	0.41E 02	0.10E 04	0.28	3.7	72.	62 5
240.	-2.	-0.10E 04	0.12E 04	0.74E 02	0.11E 04	0.33	3.8	82.	62 6
248.	-15.	-0.93E 04	0.94E 04	0.27E 02	0.94E 04	0.77	4.0	77.	62 7
248.	-7.	-0.46E 04	0.46E 04	0.26E 01	0.46E 04	0.50	4.3	78.	62 8
240.	-1.	-0.58E 03	0.14E 04	0.40E 03	0.99E 03	0.35	3.9	85.	62 9
248.	-22.	-0.14E 05	0.14E 05	0.17E 03	0.14E 05	0.45	4.4	80.	62 10
240.	-25.	-0.15E 05	0.16E 05	0.33E 03	0.16E 05	0.61	5.4	83.	62 11
248.	-10.	-0.65E 04	0.66E 04	0.53E 02	0.65E 04	0.44	4.4	77.	62 12

TSUM 2920.      MEAN PLS -12.      Q NET -0.91E 05      Q GROSS 0.97E 05      Q RIGHT 0.32E 04      Q LEFT 0.94E 05      H MEAN 0.55      AVPER 4.4      AVANG 80.      DATE 1962

YEARLY SUMMARY

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-11.	-0.70E 04	0.84E 04	0.71E 03	0.77E 04	0.58	4.6	81.	63 1
224.	-12.	-0.69E 04	0.76E 04	0.36E 03	0.72E 04	0.62	5.0	80.	63 2
248.	-11.	-0.72E 04	0.84E 04	0.56E 03	0.78E 04	0.69	4.5	84.	63 3
240.	-28.	-0.17E 05	0.18E 05	0.65E 03	0.18E 05	0.88	4.3	80.	63 4
248.	-7.	-0.48E 04	0.50E 04	0.10E 03	0.49E 04	0.43	3.5	76.	63 5
240.	-14.	-0.84E 04	0.10E 05	0.77E 03	0.92E 04	0.97	3.9	81.	63 6
248.	-23.	-0.15E 05	0.15E 05	0.53E 02	0.15E 05	0.79	4.1	77.	63 7
248.	-10.	-0.62E 04	0.62E 04	0.27E 02	0.62E 04	0.61	4.3	72.	63 8
240.	0.	0.17E 02	0.36E 03	0.19E 03	0.17E 03	0.15	4.4	74.	63 9
248.	-0.	-0.37E 02	0.60E 02	0.12E 02	0.48E 02	0.05	5.1	55.	63 10
240.	-9.	-0.55E 04	0.57E 04	0.11E 03	0.56E 04	0.38	4.9	80.	63 11
248.	-5.	-0.29E 04	0.32E 04	0.13E 03	0.31E 04	0.43	4.7	78.	63 12

TSUM 2920.      MEAN PLS -11.      Q NET -0.81E 05      Q GROSS 0.88E 05      Q RIGHT 0.37E 04      Q LEFT 0.84E 05      H MEAN 0.55      AVPER 4.4      AVANG 78.      DATE 1963

YEARLY SUMMARY

STATION = 6 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-6.	-0.36E 04	0.47E 04	0.57E 03	0.42E 04	0.67	4.9	83.	64 1
232.	-68.	-0.40E 05	0.41E 05	0.13E 03	0.41E 05	0.89	5.2	81.	64 2
248.	-12.	-0.79E 04	0.97E 04	0.91E 03	0.88E 04	0.78	5.3	87.	64 3
240.	-2.	-0.14E 04	0.26E 04	0.60E 03	0.20E 04	0.54	4.3	89.	64 4
248.	-4.	-0.24E 04	0.27E 04	0.13E 03	0.25E 04	0.35	3.8	74.	64 5
240.	-1.	-0.44E 03	0.58E 03	0.69E 02	0.51E 03	0.22	3.0	67.	64 6
248.	-37.	-0.23E 05	0.24E 05	0.23E 03	0.24E 05	1.09	4.2	81.	64 7
248.	-11.	-0.72E 04	0.78E 04	0.32E 03	0.75E 04	0.95	4.3	81.	64 8
240.	-1.	-0.80E 03	0.10E 04	0.99E 02	0.90E 03	0.19	4.5	79.	64 9
248.	-17.	-0.11E 05	0.14E 05	0.13E 04	0.12E 05	0.44	5.9	81.	64 10
240.	-4.	-0.25E 04	0.37E 04	0.56E 03	0.31E 04	0.43	4.3	79.	64 11
248.	1.	0.72E 03	0.15E 04	0.11E 04	0.40E 03	0.52	5.0	91.	64 12

TSUM      MEAN PLS      Q NET      Q GROSS      Q RIGHT      Q LEFT      H MEAN      AVPER      AVANG      DATE

2928.      -13.      -0.10E 06      0.11E 06      0.60E 04      0.11E 06      0.59      4.5      81.      1964

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-66.	-0.42E 05	0.43E 05	0.23E 03	0.42E 05	0.90	5.2	80.	65 1
224.	-15.	-0.87E 04	0.96E 04	0.43E 03	0.91E 04	0.49	4.8	86.	65 2
248.	-14.	-0.89E 04	0.99E 04	0.50E 03	0.94E 04	0.67	4.8	84.	65 3
240.	-6.	-0.36E 04	0.45E 04	0.44E 03	0.40E 04	0.65	4.3	82.	65 4
248.	-0.	-0.23E 03	0.42E 03	0.94E 02	0.33E 03	0.18	3.5	69.	65 5
240.	-1.	-0.66E 03	0.16E 04	0.49E 03	0.12E 04	0.44	4.1	84.	65 6
248.	-10.	-0.67E 04	0.72E 04	0.28E 03	0.69E 04	0.81	3.7	81.	65 7
248.	-27.	-0.17E 05	0.18E 05	0.32E 03	0.18E 05	1.01	3.9	79.	65 8
240.	0.	0.30E 03	0.20E 04	0.11E 04	0.83E 03	0.59	5.2	89.	65 9
248.	-15.	-0.94E 04	0.98E 04	0.17E 03	0.96E 04	0.38	5.1	76.	65 10
240.	-17.	-0.10E 05	0.12E 05	0.74E 03	0.11E 05	0.77	4.9	84.	65 11
248.	-1.	-0.51E 03	0.75E 03	0.12E 03	0.63E 03	0.19	4.3	80.	65 12

TSUM      MEAN PLS      Q NET      Q GROSS      Q RIGHT      Q LEFT      H MEAN      AVPER      AVANG      DATE

2920.      -14.      -0.11E 06      0.12E 06      0.49E 04      0.11E 06      0.59      4.4      81.      1965

STATION = 6 SZ DEPTH = BREAKING SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-3.	-0.20E 04	0.24E 04	0.19E 03	0.22E 04	0.30	5.0	76.	66 1
224.	-8.	-0.48E 04	0.66E 04	0.93E 03	0.57E 04	0.63	5.5	84.	66 2
248.	-9.	-0.60E 04	0.65E 04	0.25E 03	0.62E 04	0.50	4.7	78.	66 3
240.	-26.	-0.16E 05	0.17E 05	0.63E 03	0.17E 05	0.92	4.8	86.	66 4
248.	-18.	-0.12E 05	0.13E 05	0.40E 03	0.12E 05	0.86	4.2	81.	66 5
240.	-2.	-0.14E 04	0.14E 04	0.10E 01	0.14E 04	0.32	4.6	82.	66 6
248.	-11.	-0.71E 04	0.74E 04	0.13E 03	0.73E 04	0.58	3.7	71.	66 7
248.	-39.	-0.25E 05	0.25E 05	0.16E 03	0.25E 05	0.94	3.9	77.	66 8
240.	-17.	-0.11E 05	0.12E 05	0.47E 03	0.11E 05	0.83	4.2	79.	66 9
248.	-10.	-0.63E 04	0.64E 04	0.47E 02	0.64E 04	0.31	4.4	81.	66 10
240.	-9.	-0.55E 04	0.59E 04	0.20E 03	0.57E 04	0.41	4.8	83.	66 11
248.	-4.	-0.22E 04	0.27E 04	0.24E 03	0.25E 04	0.37	4.8	79.	66 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-13.	-0.98E 05	0.11E 06	0.37E 04	0.10E 06	0.58	4.5	79.	1966

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-2.	-0.13E 04	0.24E 04	0.55E 03	0.18E 04	0.44	5.0	84.	67 1
224.	-3.	-0.15E 04	0.28E 04	0.67E 03	0.22E 04	0.56	4.5	84.	67 2
248.	-13.	-0.85E 04	0.92E 04	0.37E 03	0.88E 04	0.55	4.4	82.	67 3
240.	-10.	-0.64E 04	0.71E 04	0.37E 03	0.68E 04	0.72	4.1	81.	67 4
248.	-36.	-0.23E 05	0.24E 05	0.48E 03	0.24E 05	1.15	4.3	81.	67 5
240.	-15.	-0.92E 04	0.92E 04	0.16E 02	0.92E 04	0.47	3.7	77.	67 6
248.	-26.	-0.16E 05	0.16E 05	0.32E 02	0.16E 05	0.92	4.1	78.	67 7
248.	-20.	-0.12E 05	0.13E 05	0.33E 03	0.13E 05	0.72	3.6	79.	67 8
240.	-1.	-0.44E 03	0.70E 03	0.13E 03	0.57E 03	0.25	4.3	76.	67 9
248.	-2.	-0.15E 04	0.20E 04	0.27E 03	0.17E 04	0.28	4.5	80.	67 10
240.	-146.	-0.90E 05	0.90E 05	0.32E 02	0.90E 05	1.24	5.0	77.	67 11
248.	-24.	-0.15E 05	0.17E 05	0.11E 04	0.16E 05	0.80	4.6	85.	67 12
YEARLY SUMMARY									
TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2920.	-25.	-0.19E 06	0.19E 06	0.43E 04	0.19E 06	0.68	4.3	80.	1967

STATION = 6 SZ      DEPTH = BREAKING      SHORELINE ANGLE = 89.00

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
248.	-11.	-0.69E 04	0.73E 04	0.22E 03	0.71E 04	0.40	4.6	80.	68 1
232.	-19.	-0.12E 05	0.12E 05	0.71E 02	0.12E 05	0.55	5.1	76.	68 2
248.	-14.	-0.91E 04	0.11E 05	0.10E 04	0.10E 05	0.72	4.8	78.	68 3
240.	-19.	-0.12E 05	0.13E 05	0.46E 03	0.12E 05	0.75	4.1	79.	68 4
248.	-24.	-0.15E 05	0.16E 05	0.39E 03	0.15E 05	0.86	3.8	77.	68 5
240.	-25.	-0.15E 05	0.15E 05	0.10E 02	0.15E 05	0.82	4.9	74.	68 6
248.	-21.	-0.13E 05	0.13E 05	0.49E 02	0.13E 05	0.63	3.8	77.	68 7
248.	-6.	-0.35E 04	0.36E 04	0.33E 02	0.36E 04	0.43	4.0	73.	68 8
240.	-3.	-0.19E 04	0.27E 04	0.39E 03	0.23E 04	0.41	3.6	77.	68 9
248.	-2.	-0.11E 04	0.11E 04	0.29E 02	0.11E 04	0.19	4.4	70.	68 10
240.	-9.	-0.58E 04	0.69E 04	0.54E 03	0.63E 04	0.74	5.0	82.	68 11
248.	-20.	-0.13E 05	0.14E 05	0.58E 03	0.13E 05	0.77	5.0	82.	68 12

TSUM	MEAN PLS	Q NET	Q GROSS	Q RIGHT	Q LEFT	H MEAN	AVPER	AVANG	DATE
2928.	-14.	-0.11E 06	0.12E 06	0.38E 04	0.11E 06	0.60	4.4	77.	1968

THIRTEEN YEAR SUMMARY

MEXICO BEACH ST = 6 SZ

SHORELINE ANGLE = 89.00 DEGREES AZIMUTH

TOTAL NUMBER OF OBSERVATIONS = 37992.

MEAN NET ENERGY FLUX = -15.

NET LONGSHORE TRANSPORT = -0.14E 07

NET TRANSPORT EASTERLY OR NORTHERLY

GROSS LONGSHORE TRANSPORT = 0.16E 07

NET LONGSHORE TRANSPORT RIGHT = 0.62E 05

NET LONGSHORE TRANSPORT LEFT = 0.15E 07

MEAN SIGNIFICANT HEIGHT = 0.60 FEET

MEAN PEAK PERIOD = 4.5 SECONDS

MEAN DIRECTION OF WAVE ORTHOGONAL APPROACH = 80.2 DEGREES RELATIVE TO SHORE

MEXICO BEACH, FLORIDA

APPENDIX B  
GEOTECHNICAL INVESTIGATION

MEXICO BEACH, FLORIDA

APPENDIX B

GEOTECHNICAL INVESTIGATION

Table of Contents

<u>Item</u>	<u>Page</u>
Sediment Analysis	B-1
Location of Alternative Disposal Sites and Borings (Figure B-1)	B-2
Log of Borings and Gradation Curves	
Hole No. 55-2-84	B-3
Hole No. 55-3-84	B-4
Hole No. 55-4-84	B-5
Hole No. 55-5-84	B-6
Hole No. 55-6-84	B-7
Hole No. 55-7-84	B-8
Hole No. 55-8-84	B-9
Hole No. 55-9-84	B-10
Hole No. 55-10-84	B-11

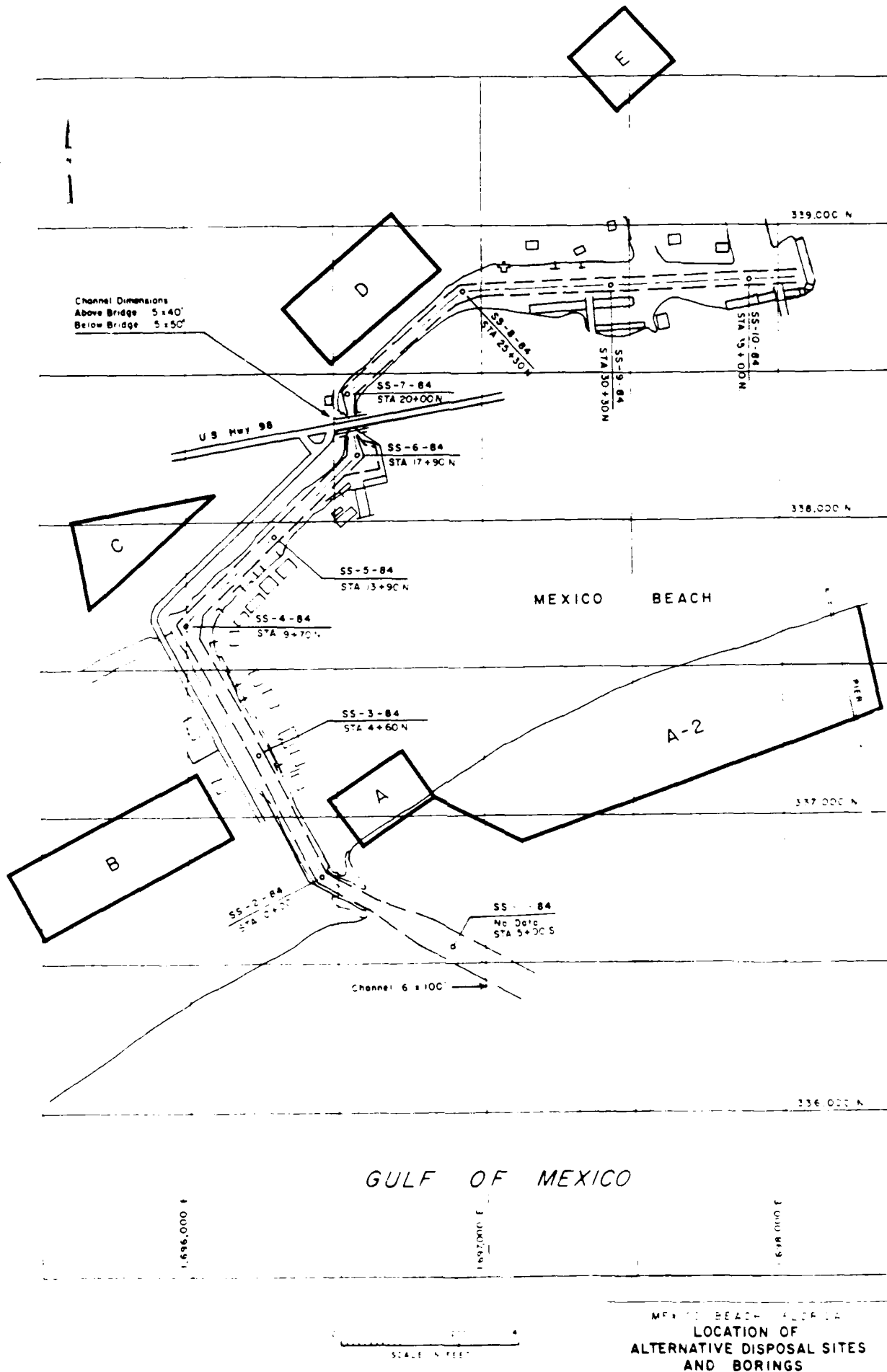
## MEXICO BEACH, FLORIDA

### APPENDIX B GEOTECHNICAL INVESTIGATION

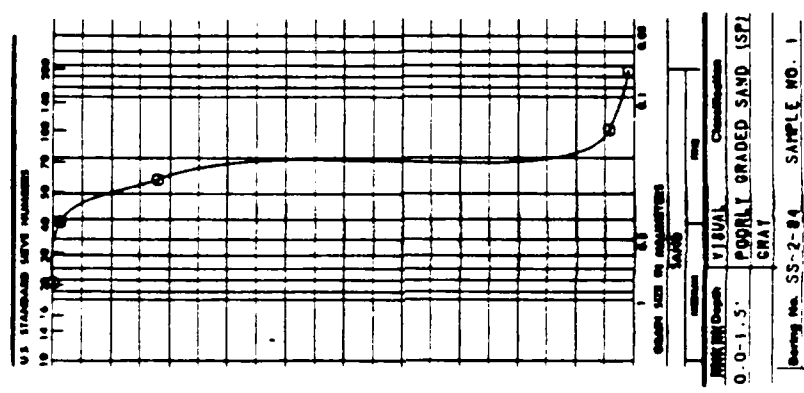
#### SEDIMENT ANALYSIS

Geotechnical investigations included nine borings to depths ranging from 9.0 to 10.5 feet below the existing channel bottom. Samples were taken using a splitspoon sampler (Standard Penetration Tests). Additional testing, including Atterberg Limits, sieve analysis and loss on ignition tests, was conducted on designated samples. Locations of the borings and results of the tests are shown on the following pages. All sample testing, including elutriate and chemical analysis, was conducted at the South Atlantic Division Laboratory in Marietta, Georgia.

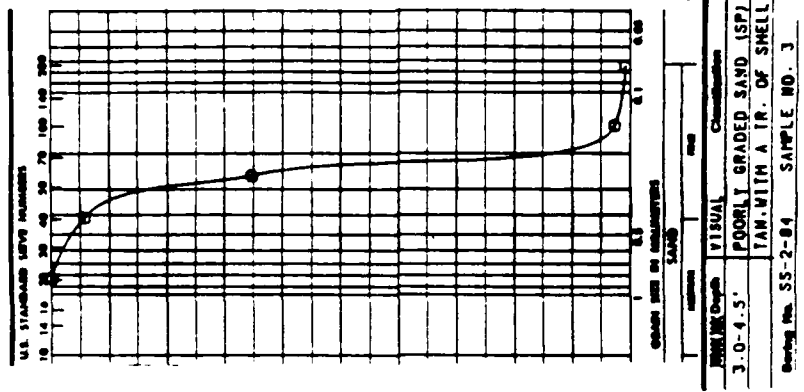
Between the inlet mouth and the Highway 98 bridge, the near surface soils consist of black stained, loose to very dense, poorly graded sands and silty sands extending from the existing channel bottom to a depth of 10.5 feet below the channel bottom. In the canal above the bridge, the soils have substantially more silt and organics mixed in with the sand and the blow counts dropped off to the weight of the hammer. In the extreme upper reaches of the canal above the bridge, a low density organic silt was encountered. Disposal of this material will require the use of a dike upland area.



HOLE NO. 55-2-84			90' (EL. -142)		CLASSIFICATION OF MATERIALS (Description)	SAMPLE NO.
ELEVATION	DEPTH	LEGEND				
-5.2	3.0				(SP) TAN & GRAY POORLY GRADED SAND	1
	2				YELLOW, WHITE	2
	4				TAN, GRAY	3
-11.2	6				NO SAMPLE	4
	8					5
-14.2	9				B.O.H.	6



FINING Depth	Visual	Classification
0.0-1.5'	POORLY GRADED SAND (SP)	CRAY
Boring No. SS-2-84 SAMPLE NO. 1		



FINING Depth	Visual	Classification
3.0-4.5'	POORLY GRADED SAND (SP)	TAN WITH A TR. OF SHELL
Boring No. SS-2-84 SAMPLE NO. 3		

NOTE: HOLE NO. SS-1-84 BORING WAS NOT MADE.

MEXICO BEACH, FLORIDA

LOG OF BORINGS AND GRADATION CURVES

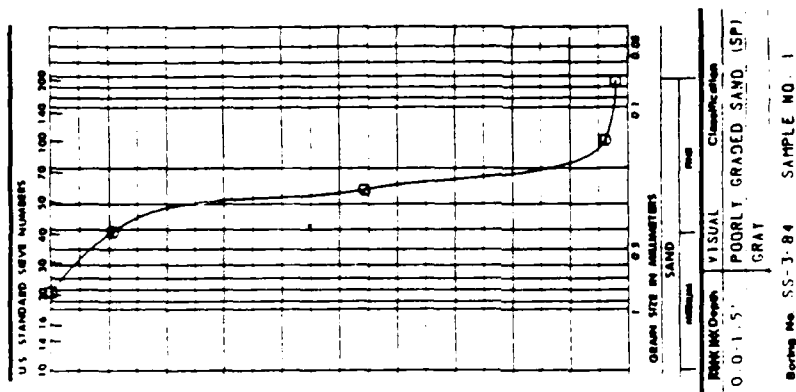
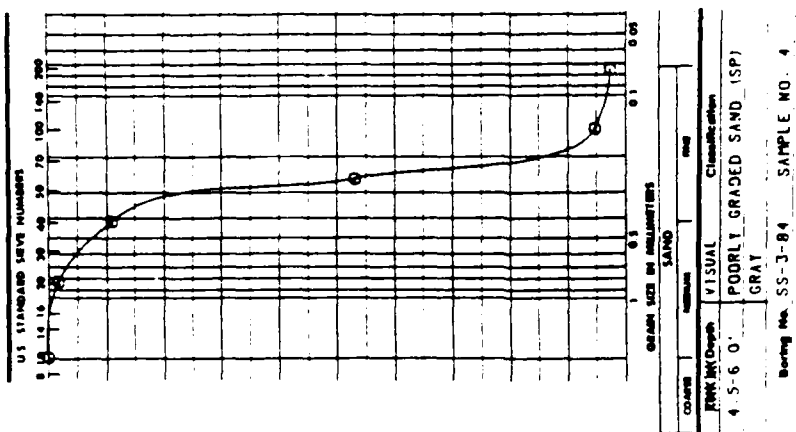
W&A, B. 100

SS-3-84

10.5' (EL. 14.5)

5' TOTAL DEPTH OF HOLE

ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE NO.
-4.0	0	.....	(SP) TAN, BLACK, POORLY GRADED SAND W/TR SILT	1
	2	.....	POORLY GRADED SAND W/TR SHELLS (1/2" MAX)	2
	4	.....	TAN, GRAY, POORLY GRADED SAND	3
	6	.....	TAN, POORLY GRADED SAND W/SOME SHELLS (1/4" MAX)	4
	8	.....	WHITE, POORLY GRADED SAND	5
	10	.....	TAN, POORLY GRADED SAND	6
-14.5	10.5	.....	BOH	7

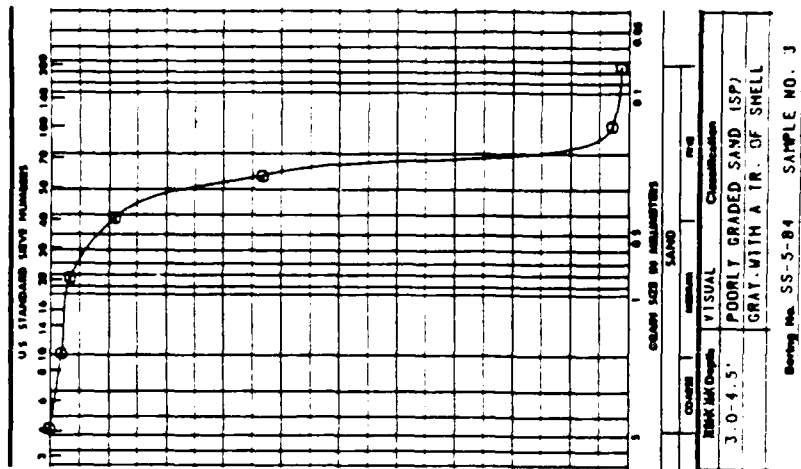
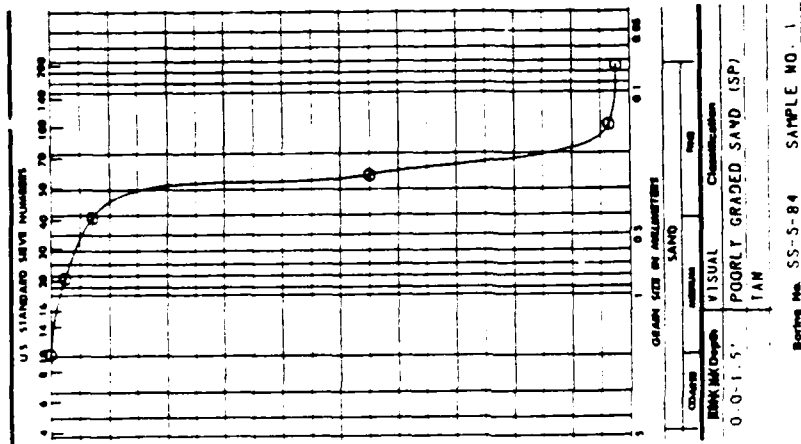


# MEXICO BEACH, FLORIDA

## LOG OF BORINGS AND GRADATION CURVES



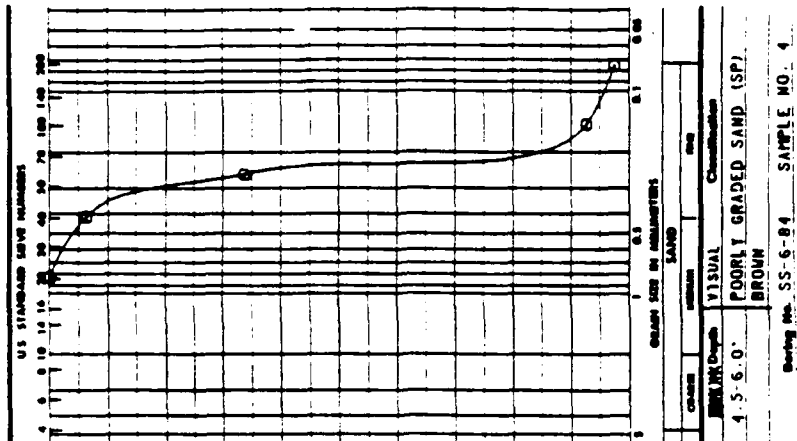
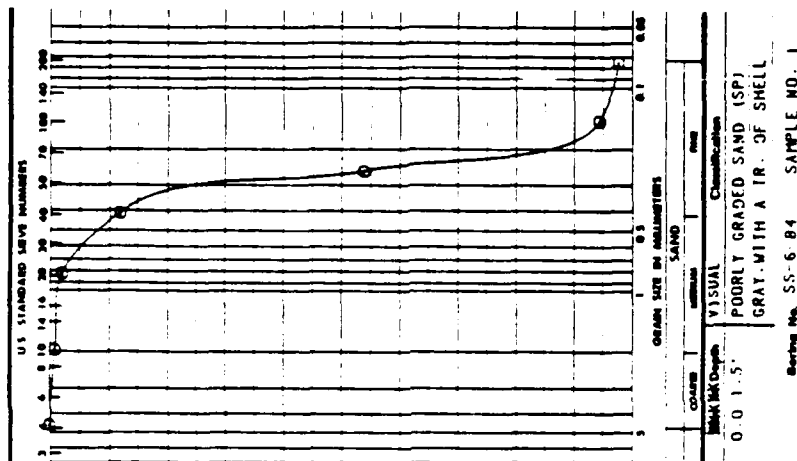
TOTAL DEPTH OF HOLE		10.5' (EL 73.3)		SS-5-84	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE NO.	
-3.1	0.0	•	(SP) TAN GRAY POORLY GRADED SAND	1	
	2	•	BROWN W/SOME SHELLS (3/4" MAX)	2	
	4	•	BROWN, WHITE, RED W/TR SHELL (3/4" MAX)	3	
	5	•	WHITE, TAN, POORLY GRADED SAND	4	
-4.3	5	✕	NO SAMPLE	5	
-5.3	3	•	(SP) TAN GRAY POORLY GRADED SAND W/SOME SHELLS (1/2" MAX)	6	
-6.3	2	•	WHITE W/TR. SHELLS (3/4" MAX)	7	
			B.O.H		



MEXICO BEACH, FLORIDA

LOG OF BORINGS  
AND  
GRADATION CURVES

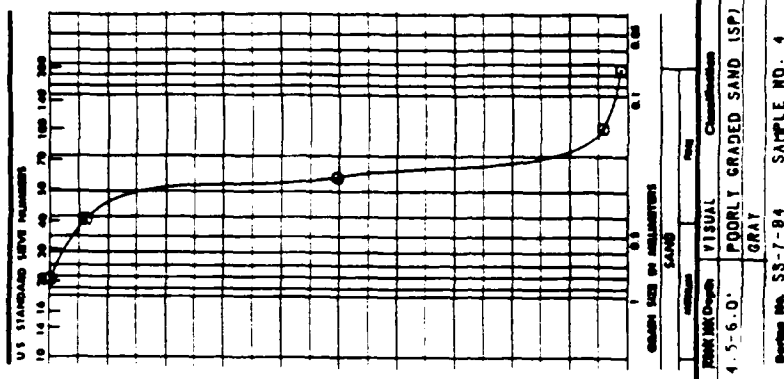
TOTAL DEPTH OF HOLE		10.5' (EL. -13.2)	HOLE NO. 55-6-84	
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Describe)	SAMPLE NO.
-2.7	0	.....	(SP) GRAY, POORLY GRADED SAND W/TR SILT & SHELLS. (1/4" MAX)	1
	2	.....	W/TR SILT & SHELLS (1/4" MAX)	2
	4	.....	BROWN W/TR SHELLS (1/4" MAX)	3
	6	.....	BROWN, BLACK GRAY, POORLY GRADED SAND	4
	8	.....	TAN, BROWN, BLACK	5
	10	.....	BROWN, POORLY GRADED SAND	6
-13.2	10.5	.....		7
			B.O.H.	



# MEXICO BEACH, FLORIDA

## LOG OF BORINGS AND GRADATION CURVES

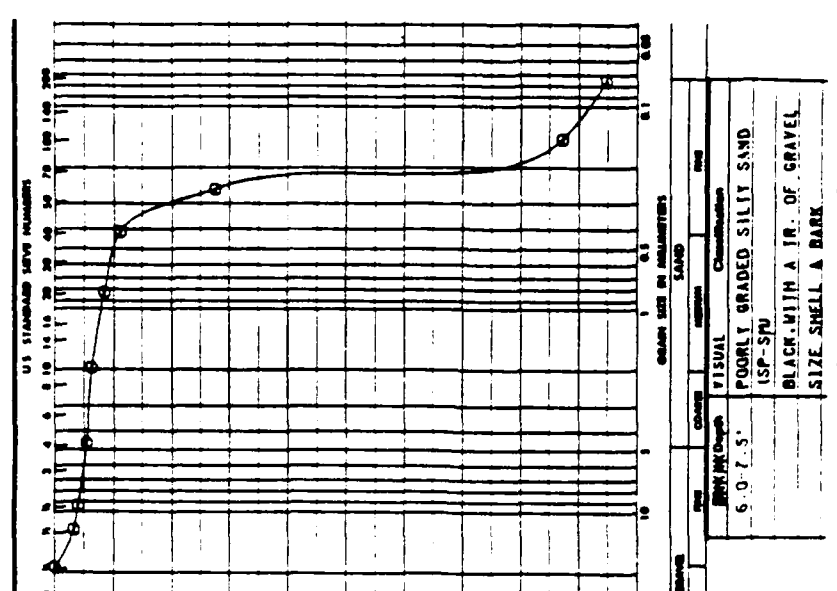
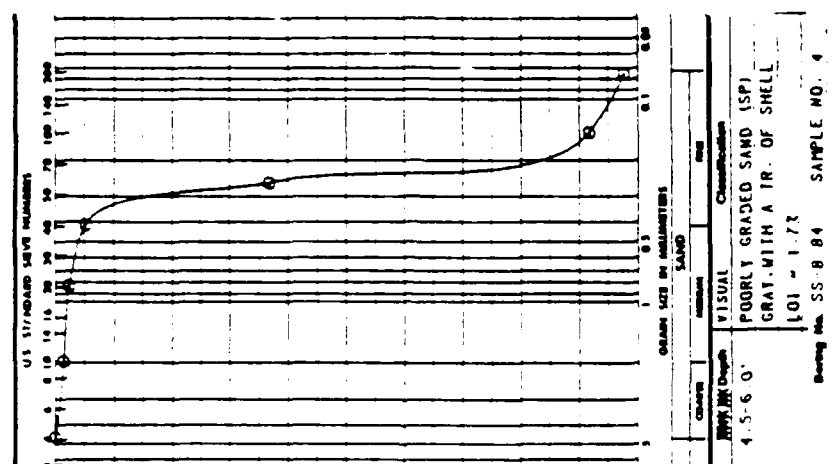
B. TOTAL DEPTH OF HOLE 105' (EL -14.1)		HOLE NO. SS-7-84		
ELEVATION	DEPTH	LEGEND	CLASSIFICATION OF MATERIALS (Description)	SAMPLE NO.
-3.6	0		NO SAMPLE	1
	2			2
-6.6	3		(SP) BROWN, POORLY GRADED SAND w/SOME SILT	3
	4			4
-9.6	6		(SM) BROWN, SILTY SAND	5
	15			6
-11.1	8		(SP) BROWN, POORLY GRADED SAND w/SOME SILT POORLY GRADED SAND	7
	16			
-14.1				



MEXICO BEACH, FLORIDA

LOG OF BORINGS  
AND  
GRADATION CURVES

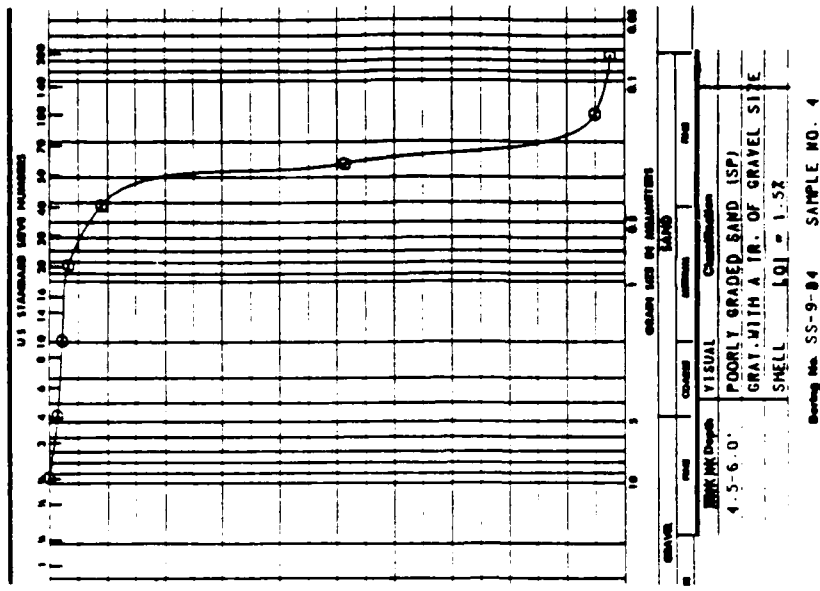
TOTAL DEPTH OF HOLE		10.5' (EL. -13.8)	HOLE NO.	
ELEVATION	DEPTH	CLASSIFICATION OF MATERIALS (Description)	SAMPLE NO.	
-3.3	0		1	
	2		2	
	4		3	
-7.8	4.5	NO SAMPLE	4	
	6	(SM) BLACK SILTY SAND W/SOME SHELLS (3/4 MAX)	5	
10.8	7.5	SILTY SAND W/SOME SHELLS (1 1/2 MAX) & W/TR OF UNL. WOOD	6	
	8		7	
-12.3	9	NO SAMPLE		
	10	(SM) BLACK, SILTY SAND		
-13.8	10.5	B.O.H.		



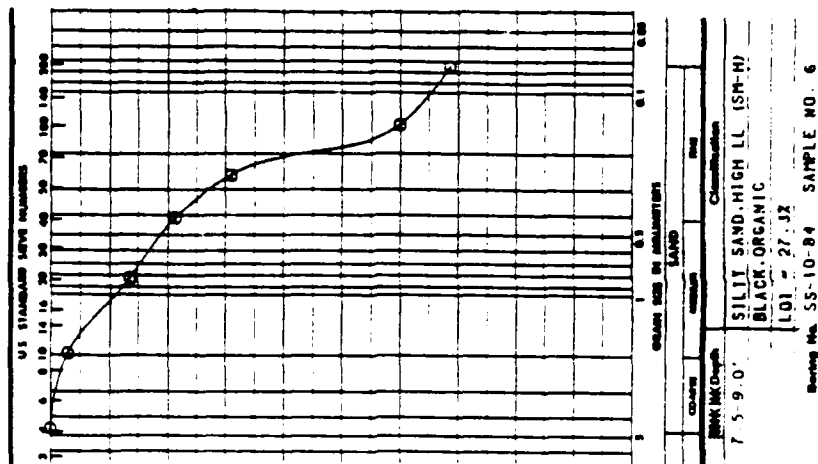
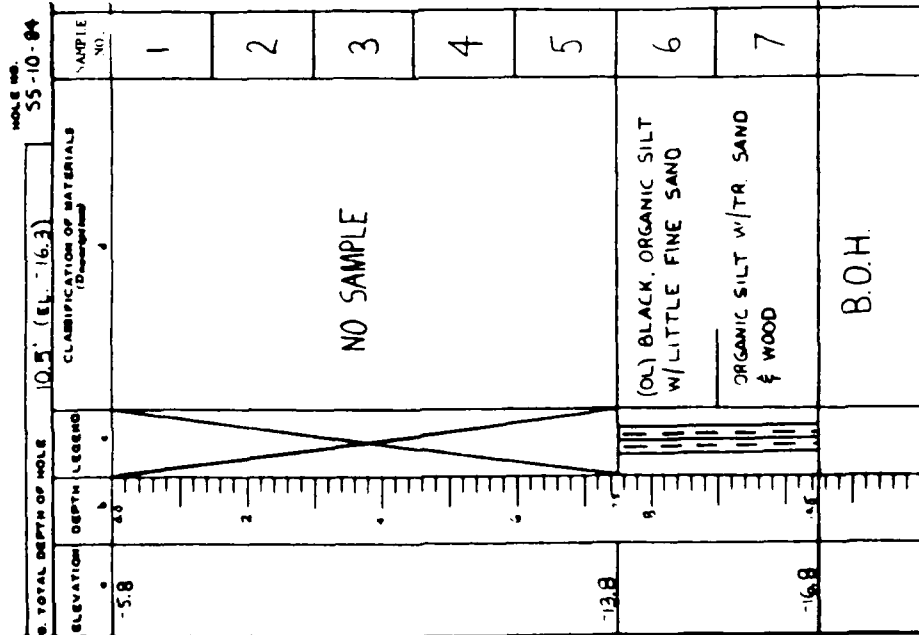
MEXICO BEACH, FLORIDA

LOG OF BORINGS  
AND  
GRADATION CURVES

HOLE NO. 55-9-84			TOTAL DEPTH OF HOLE 10.5' (EL. -13.3)		CLARIFICATION OF MATERIALS (Description)	SAMPLE NO.
ELEVATION	DEPTH	LEGEND				
-2.8	0.0					1
	2				NO SAMPLE	2
	4					3
-7.3	4.5				(SM) BLACK, SILTY SAND W/TR SHELLS (1" MAX)	4
-8.8	6					5
	8				NO SAMPLE	6
-11.8	9				(SM) BLACK, SILTY SAND W/TR DECOM. WOOD	7
-13.3	10.5				B.O.H	



MEXICO BEACH, FLORIDA  
 LOG OF BORINGS  
 AND  
 GRADATION CURVES



MEXICO BEACH, FLORIDA

LOG OF BORINGS  
AND  
GRADATION CURVES

MEXICO BEACH, FLORIDA

APPENDIX C  
ECONOMIC ANALYSIS

# TABLE OF CONTENTS

<u>ITEMS</u>	<u>PAGE NUMBERS</u>
INTRODUCTION	C-1
DESCRIPTION OF THE AREA	C-1
Human Resources	C-2
Area Economy	C-2
VESSEL CHARACTERISTICS	C-3
METHODOLOGY	C-5
PATTERNS OF VESSELS OPERATIONS	C-5
Recreation Vessels	C-5
Power Boats	C-5
Commercial Vessels	C-6
Charter Cruisers and Charter Fishing	C-6
Shrimp Boats	C-9
WITHOUT-PROJECT CONDITION CHANNEL USAGE	C-9
Channel Utilization Schedule	C-9
Computation of the Value of a Boating Day	C-10
Power Boats	C-10
Charter Boats	C-13
Charter Fishing Vessels	C-13
Charter Cruisers	C-13
Shrimp Boats	C-13
Without-Project Condition Operational Values	C-13
WITH-PROJECT CONDITION CHANNEL USAGE	C-19
Channel Utilization Schedule	C-19
Computation of the Value of a Boating Day	C-19
Power Boats	C-19
Charter Boats	C-19
Charter Fishing Vessels	C-19
Charter Cruisers	C-19
Shrimp Boats	C-19
With-Project Condition Operational Values	C-20
ALTERNATIVES CONSIDERED	C-20
BENEFITS	C-22

# LIST OF TABLES

Table No.	Title	Page No.
C-1	Demographic Characteristics for Bay County and the State of Florida	C-2
C-2	Total Personal and Per Capita Incomes in 1983	C-2
C-3	Distribution of Income by Major Industrial Class in 1981	C-3
C-4	Characteristics of Vessels Permanently Docked in the Mexico Beach Project Area	C-4
C-5	Average Operation Costs and Earnings for Charter Fishing Vessels	C-7
C-6	Average Operation Costs and Earnings for Charter Cruisers	C-8
C-7	Availability of Channel Depths at the Inlet Section of the Channel (Without-Project)	C-9
C-8	Matrix for Computing Unit Day Value Judgement Factors	C-11/12
C-9	Conversion of Points to Dollar Values	C-10
C-10	Summary of Boating Day Values	C-14
C-11	Without-Project Condition Economic Activity	C-15
C-12	Derivation of Without-Project Condition Annual Incomes for vessels needing 5-feet of depth	C-17
C-13	Without-Project Condition Average Annual Equivalent Income for vessels needing 5-feet of depth	C-16
C-14	Availability of Channel Depths at the Inlet Section of the Channel (With-Project)	C-19
C-15	With-Project Condition Economic Activity	C-21
C-16	Benefits to Improved Channel Depths	C-20

MEXICO BEACH, FL  
ECONOMIC ANALYSIS

INTRODUCTION

This Economics Appendix presents the data and calculations associated with determining benefits resulting from providing navigation improvements of Mexico Beach Channel. For presentation purposes, this Appendix is separated into nine sections as follows:

- a. Description of the Area
- b. Human Resources
- c. Vessel Characteristics
- d. Methodology
- e. Patterns of Vessel Operations
- f. Without-Project Condition Channel Usage
- g. With-Project Condition Channel Usage
- h. Alternatives Considered
- i. Benefits

DESCRIPTION OF THE AREA

Mexico Beach is located on the coast of southeastern Bay County, Florida. It is about 20 miles southeast of Panama City and 12 miles northwest of Port St. Joe. Mexico Beach is primarily a resort area with considerable commercial activities for tourists including charter fishing vessels.

Existing facilities at Mexico Beach for commercial and recreational boat use, consist of three public marinas. One of the marinas is full service in that it provides food, fuel, and supplies to the boat owners. The full service marina also provides loading and unloading facilities for commercial shrimp boats. There are 245 wet and dry slips available for vessels at the three marinas, of which, 198 are occupied. Also, there is a public launching ramp for small craft. Figure 1, in the main report, shows the approximate location of the three public marinas.

Human Resources. Bay County is a part of the Panama City Standard Metropolitan Statistical Area (SMSA). Estimated population of Bay County is 98,000, which is a 23 percent increase over the 1970 population. The 1980 estimated population density of Bay County is 131 persons per square mile. Pertinent demographic data pertaining to Bay County, and the State of Florida, are summarized in Table C-1.

TABLE C-1  
Demographic Characteristics for Bay County  
and the State of Florida, 1980

<u>ITEM</u>	<u>BAY COUNTY</u>	<u>FLORIDA</u>
Total Population	98,000	9,700,000
Percent increase '70 - '80	23.0	30.0
Density (per sq. mi.)	131	180
Age		
Under 5	8,633	570,000
5 - 19	24,546	2,117,000
20 - 64	56,174	5,368,000
65 and over	8,647	1,645,000
Median Age	29.4	34.7

Source: Florida Statistical Abstract, 1985, College of Business Administration, University of Florida.

Area Economy. Total personal and per capita incomes in 1983 for Panama City SMSA (which includes Bay County) and the State of Florida are presented in Table C-2.

TABLE C-2  
Total Personal and Per Capita Incomes in 1983

<u>AREAS</u>	<u>TOTAL PERSONAL INCOME</u> <u>(\$1,000,000)</u>	<u>PER CAPITA</u> <u>INCOME</u>
Bay County (Panama City) (SMSA)	\$ 1,013.8	\$ 9,889
State of Florida	\$123,812.4	\$11,593

Source: Florida Statistical Abstract, 1985, College of Business Administration, University of Florida.

Personal income for nonagricultural business and industry in Bay County, Florida totaled \$381.4 million in 1981. Manufacturing, services, and retail trade comprised the principal industry sectors. The high levels of income earned from services and retail trade are reflective of the large number of retired persons residing in Florida and the amount of tourism activity. A summary of income for Bay County and the State of Florida is presented in Table C-3.

TABLE C-3  
Distribution of Earnings by Major Industrial Class in 1981  
( \$1,000)

<u>INDUSTRY</u>	<u>BAY COUNTY FLORIDA</u>		<u>STATE OF FLORIDA</u>	
	<u>PERSONAL INCOME</u>	<u>%</u>	<u>PERSONAL INCOME</u>	<u>%</u>
Manufacturing	\$ 73,259	19.2	\$ 8,910,263	17.2
Construction	\$ 37,028	9.7	\$ 5,289,067	10.2
Wholesale Trade	\$ 29,298	7.7	\$ 4,599,866	8.9
Retail Trade	\$ 77,561	20.3	\$ 8,315,019	16.0
Finance, Insur. & R.E.	\$ 24,899	6.5	\$ 4,697,597	9.0
Transportation/ Communication	\$ 44,194	11.6	\$ 5,633,597	10.8
Services, Misc. <sup>1</sup>	\$ 95,179	25.0	\$14,505,241	27.9
TOTAL	\$381,418	100.0	\$51,950,650	100.0

<sup>1</sup>Includes Mining

Source: Local Area Personal Income 1976-1981, U. S. Department of Commerce, Bureau of Economic Analysis.

#### VESSEL CHARACTERISTICS

Field Surveys conducted in October 1985, and updated in October 1987, identified two distinct traffic usages of the channel at Mexico Beach. The type craft using the channel are recreation vessels and commercial vessels. In addition to the locally docked craft, transient vessels use the channel. Because there is no documented detailed data available, an analysis has not been included in this report to document the benefits associated with transient vessels using the Mexico Beach channel. Table C-4 summarizes the characteristics of vessels located in the project area which use the existing channel.

TABLE C-4  
Characteristics of Vessels Permanently Docked in the  
Mexico Beach Project Area

Type of Vessels	Vessels Physical Locations	Number of Vessels	Vessel Length (Feet)	Average Loaded Draft (Ft.)	Required Channel Depth (feet)	
Recreation Vessels:						
Power Motor Boats	Marina #1	48	24' - 30'	2.5'	3.5'	3.0'
Power Motor Boats	Marina #2	101	24' - 30'	2.5'	3.5'	3.0'
Power Motor Boats	Marina #3	30	24' - 30'	2.5'	3.5'	3.0'
Power Motor Boats	Private	200	24' - 30'	2.5'	3.5'	3.0'
SUB-TOTALS		379				
COMMERCIAL VESSELS:						
Charter Cruisers <sup>2</sup>	Marina #2	6	Up to 24'	3.0'	4.0'	3.5'
Charter Fishing <sup>2</sup>	Marina #2	10	Up to 42'	4.0'	5.0'	4.5'
Shrimp Boats	Marina #2	3	Up to 65'	4.5'	5.5'	5.0'
SUB-TOTAL		19				
TOTAL ALL VESSELS		398				

SOURCE: Local Public Marina Owners/Operators and Vessel Owners/Operators.

<sup>1</sup>Information provided by local boat operators indicates that a 1/2 foot - 1 foot safety clearance between the vessel's keel and channel bottom to assure safe boating operations is typical.

<sup>2</sup>For cost allocation purposes, charter craft are regarded as commercial vessels.

## METHODOLOGY

The methodology for evaluating economic benefits is consistent with the Water Resource Council's Principles and Guidelines (P&G) and Corps of Engineers Regulation ER 1105-2-40. The benefits from implementation of channel modifications at Mexico Beach are attributable to the comparative economic advantage of the "with-project" condition over the "without-project" conditions. The benefit evaluation primarily focused on means of eliminating (1) lost boating opportunities and (2) increased costs of boat operators using alternative channels. Because of this emphasis, the data base used to estimate benefits was carefully assembled. Extensive interviews were conducted with each owner/operator of the three public marinas as well as with owner/operators of each type vessel located in the project area. Detailed information on the economic parameters of vessel operations were derived from these interviews.

## PATTERNS OF VESSELS OPERATIONS

### Recreation Vessels:

Power Boats. Power boating is enjoyed almost year round in the project area. The boating season lasts about eight months, from March through October, with peak boating activity during late spring and summer. Typically, power boat owners use their vessels an average of 48 trips per year (one time per week during the months of March, April, September and October and twice a week during the months of May through August). The average duration of each boating trip is three hours. A typical crew size, per boating trip, is two adults and two children.

Field Survey information indicates power boat operators will select various alternatives when confronted with inadequate depths in Mexico Beach Channel. The alternatives available are: (1) Losing boating opportunities; (2) using the nearest comparable channel; and (3) continued navigation of Mexico Beach Channel. In connection with commuting to the nearest comparable channel, Port St. Joe channel, Port St. Joe, Florida is identified as the nearest comparable channel. The round trip distance to Port St. Joe from Mexico Beach is 25 miles. In connection with continued navigation of Mexico Beach Channel, some boat operators expressed a level of confidence in being able to maneuver their crafts around shoaled areas. Some of these operators reported experiencing vessel damages periodically. Vessel damages are not reported in this analysis because of limited documentation of dollar value of damages and frequency of damages.

### Commercial Vessels:

Charter Cruisers and Charter Fishing. The majority of charter vessels are family-owned and operated. Most have operated out of Mexico Beach for years. The season for the charter boat fleet lasts about eight months, from March through October, with peak boating activity during late spring and summer. Typically, charter fishing boat owners use their vessels once per week during the months of March, April, and October and three times a week during the months of May through September. Charter cruiser boat owners use their vessels in the same pattern as charter fishing boats. Field survey information indicates there is a viable charter market at Mexico Beach even though there are times when there are known inadequate depths in Mexico Beach channel. Boat operators explained the reason for the decision to stay in Mexico Beach as being related to the ever increasing competition in the charter boat service in that area. They believe that by keeping their business based at Mexico Beach rather than relocating to an alternative location, the operators will at least maintain their existing share of the charter service market. Also by relocating, the boat operators will have to compete with an established charter fleet in other locations, plus possibly bear increased operating expenses.

Tables C-5 and C-6 summarize the average vessel operating costs of the charter fishing vessels and the charter cruisers home-based in the Mexico Beach study area, respectively.

TABLE C-5  
Average Operation Costs and Earnings for Charter Fishing Vessels  
 (1 October 1988)

Vessel Length: 42'	Average Annual No. of Trips: 72
Vessel Loaded Draft: 4.0'	Average Earnings Per Trip: \$1,500 <sup>1</sup>
Average Value of Boat: \$187,000	Average Annual Earnings: \$108,000
Average Length of Trip: 10 Hours	

<u>Fixed Expenses</u>	<u>Annual</u>	<u>Costs</u> <u>Per Trip</u>
Interest	\$ 6,000	\$ 83
Depreciation	18,250	253
Insurance	1,300	18
Dry Docking	1,000	14
Other (License, Fees)	100	1
SUB-TOTAL	\$26,650	\$ 369
 <u>Variable Expenses</u>		
Fuel & Oil	\$10,800	\$ 150
Ice	720	10
Bait	1,440	20
Supplies	1,224	17
Repairs/Maintenance	4,824	67
Labor: Captain	23,000	319
Mate	18,000	250
SUB-TOTAL	\$60,008	\$ 833
Management <sup>2</sup>	\$ 6,000	\$ 83
Total Expenses	\$92,658	\$1,285
Net Return	\$15,342	\$ 215

<sup>1</sup>There are an average of 12 patrons per trip @ a fee of \$125 each.

<sup>2</sup>Management is estimated as 10% of total variable costs.

SOURCE: Local Charter Fishing Vessel Operators/Owners.

TABLE C-6  
Average Operation Costs and Earnings for Charter Cruisers  
(1 October 1988)

Average Vessel Length: 24'	Average Annual No. of Trips: 72
Average Loaded Draft: 3.0'	Average Earnings Per Trip: \$1,050 <sup>1</sup>
Average Value of Boat: \$175,000	Average Annual Earnings: \$75,600
Average Length of Trip: 10 Hours	

	<u>Costs</u>	
<u>Fixed Expenses</u>	<u>Annual</u>	<u>Per Trip</u>
Interest	\$ 3,200	\$ 44
Depreciation	7,000	97
Insurance	1,200	17
Dry Docking	1,000	14
Other	100	1
 SUB-TOTAL	 \$12,500	 \$ 173
 <u>Variable Expenses</u>		
Fuel & Oil	\$ 7,200	\$ 100
Ice	720	10
Groceries	3,600	50
Supplies	720	10
Repairs/Maintenance	1,440	20
Labor : Captain	20,000	278
Mate	12,000	167
 SUB-TOTAL	 \$45,680	 \$ 635
Management <sup>2</sup>	\$ 4,568	\$ 64
 Total Expenses	 \$62,748	 \$ 872
Net Return	\$12,852	\$ 178

<sup>1</sup>There are an average of 6 patrons per trip @ \$175 each.

<sup>2</sup>Management is estimated as 10% of total variable costs.

SOURCE: Local Charter Cruiser Vessel Owners/Operators.

Shrimp Boats. Each shrimp boat is family-owned and operated and has been home-based out of Mexico Beach for years. These shrimp boat operators ideally can make an average of thirty (30) 7-day trips annually. When the operators are confronted with inadequate channel depths in the project channel, they elect to use an alternative channel rather than lose shrimping opportunities. The nearest comparable alternative full service marina is located in Panama City, Florida. There are no significant variations in boat operating expenses when the craft operate out of the Panama City facility. The distance to suitable commercial shrimping grounds is approximately the same as the distance out of Mexico Beach. The operators are also able to load and unload their craft at various full service marinas in the immediate area of the Panama City Channel. The only additional expenses incurred by boat operators are private automobile operating expenses associated with commuting between Panama City and Mexico Beach. The round trip distance to Panama City, Florida is 40 miles. The U. S. Department of Transportation's published report, Cost of Owning and Operating Automobiles and Vans, 1984, estimates that the automobile cost per mile for intermediated size automobiles is \$0.137. This cost updated to October 1987 price level is \$0.159. (Index = CPI for private transportation historic growth rated, 1980-1984). In the analysis, the estimated cost per mile for boat operators to travel to a comparable alternative channel is \$0.159.

#### WITHOUT-PROJECT CONDITION CHANNEL USAGE

Channel Utilization Schedule. As previously discussed, the type vessels navigating the Mexico Beach Channel are recreation and commercial vessels. Field surveys indicate channel usage is predominantly in the March through October time frame for recreation boaters and May through December for commercial shrimping vessel operators. Table C-7 displays estimated percent availability of channel depths under without-project condition at the inlet section of the channel.

TABLE C-7  
AVAILABILITY OF CHANNEL DEPTHS AT THE  
INLET SECTION OF THE CHANNEL  
(WITHOUT-PROJECT)

CHANNEL DEPTH (Feet)	3.0	4.0	4.5	5.0	5.5	6.0	6.5	7.0
CHANNEL AVAIL. (%)	75	60	40	30	20	10	5	0

As indicated in Table C-7, each type vessel currently navigating Mexico Beach Channel are affected by inadequate channel depths in the inlet portion of the channel. Depending on the type and physical location of each vessel involved, there are various alternatives available for the boat operator when depths are inadequate for safe navigation. As mentioned, recreation and commercial boat operators will either lose boating opportunities, use the nearest comparable channel, or continue navigation of Mexico Beach Channel if and when adequate depths are available.

#### Computation of the Value of a Boating Day.

Power Boats - The value of a typical boating day for power motor boaters is computed using the data shown in Table C-8. The total points assigned in Table C-8 to estimate the unit day value of a recreation day at Mexico Beach, FL is fifty-two (52). Using Economic Guidance Memorandum 89-1, the converted value of 52 points to a dollar value is \$4.21 (interpolated). Table C-9 summarizes the conversion of points to dollar values as follows:

TABLE C-9  
CONVERSION OF POINTS TO DOLLAR VALUES  
VALUE = \$4.21  
(1 October 1988)

Points	0	10	20	30	40	50	60
Dollar Values	1.95	2.25	2.60	3.00	3.45	4.15	4.45

Source: Economic Guidance Memorandum 89-1

The unit day value per power boat recreationist is estimated at \$4.21. The estimated value of a lost recreation boating opportunity per vessel is computed as follows:

Power Boat Unit Day Value = \$16.84 (four recreationist per boat @ \$4.21 per person).

TABLE C-8  
MATRIX FOR COMPUTING UNIT DAY VALUE  
JUDGEMENT FACTORS

Criteria	Two general activities	Several General activities	Several general activities; one high quality value activity	Several general activities; more than one high quality high activity	Numerous High quality value activities some general activities
a) Recreation Experience					
Total Possible Points: 30					
Assigned					
Point Value: 14	0-4	5-10	11-16	17-23	24-30
b) Availability of Opportunity	Several within 1 hour travel time; a few within 30 min travel time	Several within 1 hour travel time; none within 30 min travel time	One or two within 1 hour travel time; none within 45 min travel time	None within 1 hour travel time	None within 2 hour travel time
Total Possible Points: 18					
Assigned					
Point Value: 8	0-3	4-6	7-10	11-14	15-18
c) Carrying Capacity	Minimum facility development for public health and safety	Basic facilities to conduct activity(ties)	Adequate facilities to conduct without deterioration of the resource or activity experience	Optimum facilities to conduct activity at site potential	Ultimate facilities to achieve intent of selected alternative
Total Possible Points: 14					
Assigned					
Point Value: 10	0-2	3-5	6-8	9-11	12-14

TABLE C-8 (Cont'd)  
MATRIX FOR COMPUTING UNIT DAY VALUE  
JUDGEMENT FACTORS

d) Accessibility	Limited access by any means to site or within site	Fair access, poor quality roads to site	Fair access, fair road to site; fair access, good roads within site	Good access, high standard road to site
	or within site	limited access within site		good access within site
<hr/>				
Total Possible Points: 18	0-3	4-6	7-10	11-14
Assigned Point Value: 12				15-18
<hr/>				
e) Environmental Quality	Low esthetic factors exist that significantly lower quality	Average esthetic quality; factors exist that lower quality to minor degree	Above average esthetic quality; any limiting factors can be reasonably rectified	High esthetic quality; no factors exist that lower quality
				Outstanding esthetic quality; no factors exist that lower quality
<hr/>				
Total Possible Points: 20	0-2	3-6	7-10	11-14
Assigned Point Value: 8				15-18
<hr/>				
TOTAL ASSIGNED POINTS: 52				

Charter Boats: As previously stated, the owners/operators of charter boats permanently docked in Mexico Beach are losing boating opportunities. The value of a charter boating day is estimated as the lost net return per trip. Tables C-5 and C-6 gave the average per trip net return value for charter fishing vessels and charter cruiser as \$215 and \$178, respectively. Charter boat operators are currently making less than the average annual number of boating trips per year. The charter fishing vessels are making 48 trips per year and the charter cruisers are making 56 trips per year. The without-project net return value per trip for the charter vessels are computed as follows:

Charter Fishing Vessels: \$26,650 (Total Fixed Cost) divided by 48 (current trips) + \$916 (Total Variable Cost) = \$1,471

\$1,500 (Average Maximum Net Return) - \$1,471 = \$29 (Current Net Return Value Per Trip)

Charter Cruisers: \$12,500 (Total Fixed Cost) divided by 56 (Current trips) + \$699 (Total Variable Cost) = \$922

\$1050 (Average Maximum Net Return) - \$922 = \$128 (Current Net Return Per Trip)

Shrimp Boats: As previously mentioned, when shrimp boat operators are confronted with inadequate channel depths at Mexico Beach, they elect to operate out of Panama City, Florida. There are no significant variations in boat operating expenses when the vessels operate out of Panama City. The only additional expenses incurred by boat operators are private automobile operating expenses associated with commuting between Panama City and Mexico Beach. The value of a shrimp boating opportunity is computed as follows:

Roundtrip distance to Panama City, Fla. = Forty (40) miles at \$0.133 per mile = \$5.32/Trip

Without-Project Condition Operational Values. Table C-10 summarizes the value of a boating day for all vessels permanently docked in Mexico Beach, FL. Table C-11 is a summary of economic activity under the without-project condition, or, data in Table C-10 were adjusted by channel depth availability in Table C-7. The current marina capacity at Mexico Beach is 248 wet slips of which 50 are vacant. The current composition of vessels occupying the slips are 90 percent power boats (179 slips), the remaining 19 slips are occupied by the 16 charter crafts and 3 commercial shrimp boats. This analysis limits future growth in benefits directly to marina capacity. It is

TABLE C-10  
SUMMARY OF BOATING DAY VALUES  
(1 October 1988)

MARINA	BOAT TYPE	REQUIRED CHANNEL DEPTH <sup>1</sup>	# OF BOATS	AVERAGE # OF TRIPS/BOATS	TOTAL # OF TRIPS	\$ TRIP VALUE	TOTAL ANNUAL VALUE
1	Power Boats	3.5	48	48	2304	\$ 16.84	\$ 38,799
2	Power Boats	3.5	101	48	4848	\$ 16.84	\$ 91,336
3	Power Boats	3.5	30	48	1440	\$ 16.84	\$ 24,250
Private	Power Boats	3.5	200	48	9600	\$ 3.33 <sup>2</sup>	\$ 31,968
	Charter Cruisers <sup>3</sup>	4.0	6	56	336	\$128.00	\$ 43,008
2	Charter Cruisers <sup>4</sup>	4.0	6	68	408	\$170.00	\$ 69,360
2	Charter Fishing <sup>3</sup>	5.0	10	48	480	\$ 29.00	\$ 13,920
2	Charter Fishing <sup>4</sup>	5.0	10	66	660	\$180.00	\$118,800
2	Shrimp Boats	5.5	3	30	90	\$ 5.32 <sup>5</sup>	\$ 479

C-14

- <sup>1</sup>Depth Required At the Inlet.  
<sup>2</sup>Roundtrip distance to Port St. Joe = 25 miles @ \$0.133 per mile (variable costs to operate 5 types of vehicles based on a 1984 Department of Transportation bulletin as amended by Motor Vehicle Manufacturer's Association of the U.S. Bulletin (Facts and Figures, 1988)).  
<sup>3</sup>Without-Project Conditions.  
<sup>4</sup>With-Project Conditions.  
<sup>5</sup>Roundtrip distance to Panama City = 40 miles @ \$0.133 per mile.

TABLE C-11  
WITHOUT-PROJECT CONDITION ECONOMIC ACTIVITY  
(1 October 1988)

Boating Opportunities (Trips)  
By Channel Depth (Feet) (At the Inlet)

Depth		4.0	4.5	5	5.5	6	6.5	7
Marina	Boat Type							
1	Power Boat	1382	1382	1382	1382	1382	1382	1382
2	Power Boat	2909	2909	2909	2909	2909	2909	2909
3	Power Boat	864	864	864	864	864	864	864
Private	Power Boat	5760	5760	5760	5760	5760	5760	5760
2	Charter Cruisers	202	202	202	202	202	202	202
2	Charter Fishing	0	0	144	144	144	144	144
2	Commercial Fishing	0	0	0	18	18	18	18
Total Recreational Trips		10915	10915	10915	10915	10915	10915	10915
Total Commercial Trips		202	202	346	364	364	364	364
TOTAL TRIPS ALL BOATS		11117	11117	11261	11279	11279	11279	11279
		Boating Opportunities (\$Values)						
2	Power Boats	23273	23273	23273	23273	23273	23273	23273
2	Power Boats	48988	48988	48988	48988	48988	48988	48988
3	Power Boats	14550	14550	14550	14550	14550	14550	14550
Private	Power Boats	19181	19181	19181	19181	19181	19181	19181
2	Charter Cruisers	25856	25856	25856	25856	25856	25856	25856
2	Charter Fishing	0	0	4176	4176	4176	4176	4176
2	Commercial Fishing	0	0	0	114	114	114	114
TOTAL RECREATIONAL		105992	105992	105992	105992	105992	105992	105992
TOTAL COMMERCIAL		25856	25856	30032	30146	30146	30146	30146
TOTAL \$ ALL BOATS		131848	131848	136024	136138	136138	136138	136138

assumed that under without-project condition, future growth will be achieved uniformly over the next ten years (1987-1997). After capacity is reached, the benefits are held constant for the remainder of the project life. Since 90 percent of the vessels occupying the marina slips are power recreation boats, only the power boat trip values are projected to grow in this analysis. This analysis further assumes that over the next ten years, the charter fishing vessels will uniformly leave Mexico Beach for operation out of Panama City, Florida, and recreation crafts (power boats) will occupy the vacated slips. Table C-12 summarizes the derivation of the future without-project condition average annual equivalent trip values for vessels which need 5-feet of depth and is presented as a sample of the computations necessary for each channel depth considered. For each year considered, the assumption is made that marina operators will encourage the highest and best use of each marina slip. Since shrimp boats require greater than a 5-foot channel depth, they are not included in the calculations. Table C-13 below summarizes the average annual equivalent income with a 5-foot channel in place which means that all future income has been discounted to present worth and then amortized over 50 years (1990-2039) at the current interest rate of 8.875 percent.

TABLE C-13  
WITHOUT-PROJECT CONDITION  
AVERAGE ANNUAL EQUIVALENT INCOME  
for Vessels needing 5-feet of depth  
(1 October 1988)

<u>YEAR</u>	<u>CUMULATIVE INCOMES</u>
1987	\$116,800 <sup>1</sup>
1990 (Year 1 of Project Life)	\$125,500
1995	\$139,900
1997	\$145,600
2039	<u>\$145,600</u>
AVERAGE ANNUAL EQUIVALENT (8-7/8% - 50 years)	\$139,900 <sup>2</sup>

<sup>1</sup>See Table 12 for derivation of these figures.

<sup>2</sup>Rounded to nearest 100.

As can be seen on Table C-11, there is little difference in income from assuming the highest/best use mentioned above of \$139,900 and assuming no diversions of vessels needing 5-feet of depth to another port in Table C-11, or, \$136,024. Therefore, the without-project condition analysis shall assume no diversions to other ports.

TABLE C-12  
DERIVATION OF WITHOUT-PROJECT CONDITION ANNUAL INCOMES  
for vessels needing 5-feet of depth

<u>YEAR</u>	<u>WITHOUT-PROJECT INCOMES</u>
1987	\$ 4,176 (10 Charter Fishing Vessels = \$418/vessel) <sup>1</sup> \$ 25,856 (6 Charter Cruisers) <u>\$ 86,815</u> (179 Power Boats = \$485/vessel) <sup>2</sup> \$116,847
1988	\$ 3,762 (9 Charter Fishing Vessels = \$418/vessel) \$ 25,856 (6 Charter Cruisers) \$ 89,725 (185 Power Boats = \$485/vessel) <u>\$ 383</u> (1 Charter Fishing r.t. private auto commuting) <sup>3</sup> \$119,726
1989	\$ 3,344 (8 Charter Fishing @ \$418/vessel) \$ 25,856 (6 Charter Cruisers) \$ 92,635 (191 Power Boats = \$485/vessel) <u>\$ 766</u> (2 Charter Fishing r.t private auto commuting) \$122,601
1990	\$ 2,926 (7 Charter Fishing @ \$418/vessel) \$ 25,856 (6 Charter Cruisers) \$ 95,545 (197 Power Boats = \$485/vessel) <u>\$ 1,149</u> (3 Charter Fishing r.t. private auto commuting) \$125,476
1991	\$ 2,508 (6 Charter Fishing @ \$418/vessel) \$ 25,856 (6 Charter Cruisers) \$ 98,455 (203 Power Boats = \$485/vessel) <u>\$ 1,532</u> (4 Charter Fishing r.t. private auto commuting) \$128,351
1992	\$ 2,090 (5 Charter Fishing @ \$418/vessel) \$ 25,856 (6 Charter Cruisers) \$101,365 (209 Power Boats = \$485/vessel) <u>\$ 1,915</u> (5 Charter Fishing r.t. private auto commuting) \$131,226

TABLE C-12 (Cont'd)  
DERIVATION OF WITHOUT-PROJECT CONDITION ANNUAL INCOMES  
for vessels needing 5-feet of depth

1993	\$ 1,672	(4 Charter Fishing @ \$418/vessel)
	\$ 25,856	(6 Charter Cruisers)
	\$104,275	(215 Power Boats = \$485/vessel)
	<u>\$ 2,298</u>	(6 Charter Fishing r.t private auto commuting)
	\$134,101	
1994	\$ 1,254	(3 Charter Fishing @ \$418/vessel)
	\$ 25,856	(6 Charter Cruisers)
	\$107,185	(221 Power Boats = \$485/vessel)
	<u>\$ 2,681</u>	(7 Charter Fishing r.t. private auto commuting)
	\$136,976	
1995	\$ 836	(2 Charter Fishing @ \$418/vessel)
	\$ 25,856	(6 Charter Cruisers)
	\$110,095	(227 Power Boats = \$485/vessel)
	<u>\$ 3,064</u>	(8 Charter Fishing r.t. private auto commuting)
	\$139,851	
1996	\$ 418	(1 Charter Fishing @ \$418/vessel)
	\$ 25,856	(6 Charter Cruisers)
	\$113,005	(233 Power Boats = \$485/vessel)
	<u>\$ 3,447</u>	(9 Charter Fishing r.t. private auto commuting)
	\$142,726	
1997	0	(0 Charter Fishing Vessels)
	\$ 25,856	(6 Charter Cruisers)
	\$115,915	(239 Power Boats = \$485/vessel)
	<u>\$ 3,830</u>	(10 Charter Fishing r.t. private auto commuting)
	\$145,601	

<sup>1</sup>\$4,176\10 = \$417.6 say \$418

<sup>2</sup>\$86,811\179 = \$485

<sup>3</sup>One Charter Fishing vessel operating out of Panama City, Fla. at an average of 72 trips per year at a per trip round trip private auto commuting expense of \$5.32.

## WITH-PROJECT CONDITION CHANNEL USAGE

### Channel Utilization Schedule

Interviews with vessel operators indicate that the period of channel usage with a project in place will not vary from the without project condition usage schedule. However, with increased percent availability of channel depths, there will be substantial decreases in lost boating opportunities and the need for alternative channel usages. Table C-14 displays percent availability of channel depths under with project conditions at the inlet section of the channel.

TABLE C-14  
AVAILABILITY OF CHANNEL DEPTHS AT THE  
INLET SECTION OF THE CHANNEL  
(WITH-PROJECT)

Channel Depth (Feet)	3.0	4.0	4.5	5.0	5.5	6.0	6.5	7.0
Channel Avail. (%)	97	94	92	91	90	87	88	86

### Computation of the Value of a Boating Day:

Power Boats- (Same As Under Without-Project Condition)

Charter Boats- The value of a charter boating day is estimated as the lost net return value per trip. The with-project condition net return value per trip for the charter vessels are computed as follows:

- 1) Charter Fishing Vessels: \$26,650 (Total Fixed Cost) divided by 72 (Maximum Possible Annual trips) x .91 (percent with-project channel depth availability with a 5' channel in place) + \$916  
(Total variable cost) = \$1,320.

\$1,500 (Average Maximum Net return) - \$1,320 = \$180  
(with-project net return value per trip)

- 2) Charter Cruisers: \$12,500 (Total Fixed Cost) divided by 72 (maximum possible annual trips) x .94 (percent with-project channel depth availability with a 4' channel in place) + \$699 (Total variable cost) = \$880

\$1,050 (Average Maximum Net Return) - \$880 = \$170 (with-project net return value per trip).

Shrimp Boats: (Same as under Without-Project Condition.)

With-Project Condition Operational Values. As indicated in Table C-14, the channel will be available for a greater percentage of time under the with-project condition. Users will approach but will not achieve maximum level of economic activity. Table C-15 summarizes the level of economic activity expected to occur under with-project condition by channel depth, along with the value of that activity.

#### ALTERNATIVES CONSIDERED

Various channel depths of 4, 5, 6, and 7 feet (mean low water) were considered to determine the optimum scale of navigation improvements. Varying channel widths are not a factor in the economic analysis because the field survey indicated no delay or congestion problems being experienced by users.

#### BENEFITS:

The benefits from implementation of channel modifications at Mexico Beach are attributable to the comparative economic advantage of the with-project condition over the without-project condition. Benefits accruing to channel improvements, by providing reliable depths for vessel use, are attributable to the net increase in revenues over the without-project condition, and reduced expenses associated with using alternative channels. Commercial vessel benefits are based on the reduced operating expenses and associated increase in revenues for the charter fleet and reduced transportation costs to crews of shrimp boats. Recreational benefits are based on the unit day value as a proxy for the willingness of the user to pay during a one year-period.

Table C-16 presents a summary of annual benefits which may accrue to the various channel depths at Mexico Beach. For the expected vessel traffic using the Mexico Beach facilities, the maximum commercial vessel benefits attributable to channel improvement is for a 5-1/2 foot channel. No net gain in incremental benefits for a 6-foot channel indicates the absence of users requiring greater than a 5-1/2 foot channel. The maximum recreational benefits are attained with a 4-foot channel improvement.

Table C-16  
Benefits to Improved Channel Depths (\$1,000)  
(1 October 1988)

<u>Condition</u>	<u>Channel Depth at Inlet (Feet)</u>						
	4	4.5	5	5.5	6	6.5	7
With-Project	231.7	231.7	339.9	340.3	340.3	340.3	340.3
Without-Project	<u>131.8</u>	<u>131.8</u>	<u>136.0</u>	<u>136.1</u>	<u>136.1</u>	<u>136.1</u>	<u>136.1</u>
Benefits	99.9	99.9	203.9	204.2	204.2	204.2	204.2

TABLE C-15  
WITH-PROJECT CONDITION ECONOMIC ACTIVITY  
(1 October 1988)

Boating Opportunities (Trips)  
By Channel Depth (Feet) (At the Inlet)

Marina	Boat Type	4.0	4.5	5	5.5	6	6.5	7
1	Power Boat	2166	2166	2166	2166	2166	2166	2166
2	Power Boat	4557	4557	4557	4557	4557	4557	4557
3	Power Boat	1354	1354	1354	1354	1354	1354	1354
Private	Power Boat	9024	9024	9024	9024	9024	9024	9024
2	Charter Cruisers	384	384	384	384	384	384	384
2	Charter Fishing	0	0	601	601	601	601	601
2	Commercial Fishing	0	0	81	81	81	81	81
TOTAL RECREATIONAL TRIPS		17100	17100	17100	17100	17100	17100	17100
TOTAL COMMERCIAL TRIPS		384	384	985	1066	1066	1066	1066
TOTAL TRIPS ALL BOATS		17484	17484	18085	18166	18166	18166	18166

Boating Opportunities (\$Value)

	4.0	4.5	5	5.5	6	6.5	7
1	Power Boat	36,475	36,475	36,475	36,475	36,475	36,475
2	Power Boat	77,077	77,077	77,077	77,077	77,077	77,077
3	Power Boat	22,801	22,801	22,801	22,801	22,801	22,801
Private	Power Boat	30,050	30,050	30,050	30,050	30,050	30,050
2	Charter Cruisers	65,280	65,280	65,280	65,280	65,280	65,280
2	Charter Fishing	0	0	108,180	108,180	108,180	108,180
2	Commercial Fishing	0	0	431	431	431	431
TOTAL RECREATIONAL		166,403	166,403	166,403	166,403	166,403	166,403
TOTAL COMMERCIAL		65,280	65,280	173,460	173,891	173,891	173,891
TOTAL \$ ALL BOATS BENEFITS		231,683	231,683	339,863	340,294	340,294	340,294

MEXICO BEACH, FLORIDA

APPENDIX D  
CHANNEL DESIGN AND COST ESTIMATES

MEXICO BEACH, FLORIDA

APPENDIX D  
CHANNEL DESIGN AND COST ESTIMATES

Table of Contents

<u>Item</u>	<u>Page</u>
Channel Design Considerations	D-1
Introduction	D-1
Channel Design Criteria	D-1
Design Vessel	D-1
Channel Depth	D-2
Channel Width	D-2
Channel Sideslope	D-3
Sand Bypassing	D-3
Disposal Area	D-3
Jetties	D-4
Cost Estimates	D-4
General	D-4
Interest During Construction	D-4

Tables

<u>Description</u>	<u>Page</u>
Alternative 1A - Unstabilized Channel, (6x100-foot Inlet Channel Without Jetties)	
Initial Costs	D-6
Annual Costs	D-7
Alternative 1B - Unstabilized Channel with Impoundment Area	
Initial Costs	D-8
Annual Costs	D-9
Alternative 1C - Unstabilized Channel with Fixed Sand Bypassing Unit	
Initial Costs	D-10
Annual Costs	D-12
Alternative 2A - Stabilized Channel (6x100-foot Inlet Channel with Dual Jetties)	
Initial Costs	D-14
Annual Costs	D-16
Alternative 2B - Stabilized Channel (6x100-foot Inlet Channel with Single Jetty)	
Initial Costs	D-17
Annual Costs	D-19
Alternative 3 - Channel Stabilized (5x100-foot Channel Without Jetties)	
Initial Costs	D-20
Annual Costs	D-21
Alternative 3A - Stabilized by Constant Dredging (Contract Dredge - 8 m. Operation)	
Initial Costs	D-22
Annual Costs	D-23

MEXICO BEACH, FLORIDA  
TABLE OF CONTENTS (CONT'D)

Tables

<u>Description</u>	<u>Page</u>
Alternative 4 - Channel Stabilized by Constant Dredging (Dedicated Dredge - 12 mo. Operation)	
Initial Costs	D-24
Annual Costs	D-25
Alternative 4A - Channel Stabilized By Constant Dredging (Dedicated Dredge - 8 mo. Operation)	
Initial Costs	D-26
Annual Costs	D-27

## MEXICO BEACH, FLORIDA

### APPENDIX D CHANNEL DESIGN AND COST ESTIMATES

#### CHANNEL DESIGN CONSIDERATIONS

##### INTRODUCTION

During the formulation of the plans for channel improvement, a number of possible plan features were evaluated in various combinations. These were: channel excavation and maintenance, sand bypassing and impoundment areas, containment areas for dredged material, and channel stabilization measures using jetties. Channel excavation and maintenance requires the dredging of material within the channel boundaries. Sand bypassing, with and without impoundment areas, requires the construction of areas outside the channel to intercept and store littoral material until dredging and bypassing is convenient, or continuous bypassing, if storage is not convenient. Single and twin jetty systems were also considered. Jetties function as wave barriers to provide safe operating conditions for vessels and also intercept or divert littoral drift.

##### CHANNEL DESIGN CRITERIA

The design of shallow draft channels for small vessels is based on the requirements for safe navigation and efficient future maintenance. Design criteria used in this study were obtained from Engineer Manual (EM) 1110-2-1607, TIDAL HYDRAULICS, 2 August 1965, and EM 1110-2-1615, HYDRAULIC DESIGN OF SMALL BOAT HARBORS, 25 September 1984, (Department of the Army, Corps of Engineers, Office of the Chief of Engineers) and were used to determine the channel dimensions based on the design vessel. General use was also made of EM 1110-2-2904, DESIGN OF BREAKWATERS AND JETTIES, EM 1110-2-5025, DREDGING AND DREDGED MATERIAL DISPOSAL, and EM 1110-2-5026, BENEFICIAL USES OF DREDGED MATERIAL.

##### DESIGN VESSEL

As shown in Table C-4, the resident vessel fleet consists of 379 recreational power boats, all with a length between 24 and 30 feet and a loaded draft of 2.5 feet, and 19 commercial vessels, of which 10 are charter fishing vessels with lengths up to 42 feet and loaded drafts of 4 feet and 3 are shrimp boats with lengths up to 65 feet and loaded drafts of 4.5 feet. A shrimp boat 65 feet long, 22 feet wide, and drawing 4.5 feet was used as the primary design vessel. Later economic analysis determined that the benefits for these craft from the proposed channel

improvements was insufficient to justify dimensions for their accommodation (see Table C-15). At that point the larger charter fishing vessels were adopted as the design vessel, and conditions were checked for a vessel 42 feet long, 14 feet wide, and drawing 4 feet loaded.

#### CHANNEL DEPTH

The EMs recommend channel depths composed of the vessel draft plus allowances for squat, wave conditions, and safety conditions. As noted above, the vessels presently using the existing channel have loaded drafts that range from 2.5 to 4.5 feet. Obviously, any depth adequate for the larger vessels will accommodate the smaller ones. Squat for small craft moving at reasonable speed in entrance channels is generally taken as 1 foot. For low speed movement in interior channels, basins, etc. squat is about 0.5 feet. More sophisticated analysis for squat was not considered justified at this site. Also, a wave allowance of about 1 foot in the gulf channel segment and none in the interior channels was considered adequate. In the interest of safety, a minimum clearance of 2 feet is recommended for channels with soft bottoms, such as sand and silt, which is the case here. Summing the recommended allowances results in a channel depth of 8.5 feet for the gulf channel and 7 feet for the interior segments. During this study various underkeel clearances were evaluated in relation to the probability of damages to vessels since it was learned that local users consistently operate at allowances less than those recommended.

In addition to that depth necessary for safe navigation, additional overdepth can be used to store shoaling material and extend the interval between maintenance dredging operations. Consideration was given to using an extra 2 feet of depth for storage, but this did not prove practical. A dredging tolerance of 1 to 2 feet is usually allowed for the inaccuracies of the dredging process and another 1 to 2 feet is allowed for advanced maintenance. These additional allowances are not reliably available and are therefore not considered part of the design depth.

#### CHANNEL WIDTH

Guidance on channel width is not as definitive as that for depth. However, based on recommendations in "Evaluation of Present State of Knowledge of Factors Affecting Tidal Hydraulics and Related Phenomenon," (U. S. Army Corps of Engineers Committee on Tidal Hydraulics), the minimum channel width in open unprotected waters, such as the gulf leg at Mexico Beach, should be about 5 times the design vessel beam, resulting in a 70-foot wide channel for the 14 feet wide shrimp vessels using Mexico Beach Inlet.

Also, since strong cross winds can be hazardous to navigation, an increase in the gulf channel width to 100 feet was considered appropriate for greater safety. In addition, the increased width would provide storage for littoral material which should increase channel availability. In protected waters inland, conditions are much calmer and vessel operators have better navigation references, therefore, the existing channel widths of 50 feet in the lower harbor below the Highway 98 bridge and 40 feet in the upper harbor above the bridge were considered adequate.

#### CHANNEL SIDE SLOPE

Side slopes for navigation channels are determined by the type of soil and the hydraulic forces encountered. Geotechnical investigations indicate that no rock or hard-pan is expected. For design purposes a trapezoidal channel section with side slopes of 1 vertical on 5 horizontal was used for the inlet channel and a section with 1 on 3 side slopes was used for the protected waters of the inner harbor. It was realized, however, that sloughing caused by waves and currents would result in side slopes of 1 on 3 in the entrance shortly after dredging and that those slopes would flatten further to 1 on 7 in time.

#### SAND BYPASSING

Sand bypassing would require a substantial plant operating constantly, or, more reasonably, include the construction of impoundment areas which intercept and store drift material for subsequent removal and distribution to downdrift areas. A net eastward drift, as at Mexico Beach inlet, indicated that the greater storage capacity would be required west of the channel. Design of impoundment areas was based on early information on the littoral transport budget which, while the best available, was known to be inadequate. Later computations by the Coastal Engineering Research Center using data from the Wave Information Study clearly indicated that an impoundment area, or areas, was impractical.

#### DISPOSAL AREA

Material from above the bridge must be placed in an upland disposal area. Dikes for that area would be constructed using the sandy material available on site after a suitable area was cleared and grubbed of all vegetation and debris. The dikes should have side slopes of approximately 1 vertical on 3 horizontal with a 3-foot freeboard above the top of the weir. The crest width of the dike should be about 10 feet. The material dredged from the lower reaches below the bridge is suitable for beach and dune renourishment. Some of this sand is

stained but would bleach out over time.

## JETTIES

For an inlet backed by a water body with a tidal prism large enough to provide adequate flow velocity, a jetty structure can be used to direct and confine flow to a selected channel and prevent or reduce shoaling of the channel. That is not the case at Mexico Beach inlet where the tidal prism is completely inadequate for this purpose. Jetties can also stabilize the inlet location and protect the entrance channel from storm waves and cross currents.

Conceptually, jetties seemed to offer a solution to some of the problems at Mexico Beach inlet. Preliminary design was performed using the principles of good jetty design: foundation characteristics; water level variations; waves and currents; shoreline and depth changes; sediment and flow characteristics of the tidal prism; littoral drift; probable effects of the structure on existing conditions; prior projects and their effects; and, ecology and aesthetics of the area.

Preliminary cost estimates of the initial cost of construction and the annual costs resulting from interest and amortization, operation and maintenance were used in evaluating early plans. Since those evaluations clearly showed that jetties were not a viable solution at this site further design was not pursued.

## COST ESTIMATES

### GENERAL

All estimates have been updated to October 1988 price levels and an interest rate of 8 7/8 percent. In addition, the estimates for the preliminary alternatives have been updated by increasing the estimate of the littoral drift volume from 75,000 cy/yr to 181,200 cy/yr. Every effort was made to carry this change throughout these alternatives. However, in the event some factor was overlooked, it would only further decrease their feasibility, and, therefore, the enclosed estimates are considered adequate for comparison purposes.

### INTEREST DURING CONSTRUCTION

Interest during construction was computed at the authorized interest rate for the estimated actual period of construction for all alternatives. This period varied from as little as 1 month for plans where only a nominal amount of dredging was required

for initiation, up to a maximum of 3 months where significant construction was required.

ALTERNATIVE 1A - UNSTABILIZED CHANNEL  
6- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
INITIAL COSTS

		Unit	Unit Cost(\$)	Quantity	Total Cost
Item					
FEDERAL FIRST COST					
09	CHANNELS				
	Dredging - Inlet Channel	CY	2.17	12000	\$26,000
	- Canal Channel	CY	2.17	22300	48,400
	Mobilization and Demobilization	LS	Job	1	20,000
	Subtotal				94,400
	Contingencies (25%)				23,600
	Subtotal Channels				\$118,000
30	ENGINEERING AND DESIGN				9,400
31	SUPERVISION AND ADMINISTRATION				6,500
	Subtotal				134,000
	Non-Federal Contribution (10%)				13,400
	TOTAL CORPS OF ENGINEERS FIRST COST				121,000
	OTHER FEDERAL AGENCIES				
	Navigation Aids (USCG)	LS	Job	1	16,000
	TOTAL FEDERAL FIRST COST				137,000
NON-FEDERAL FIRST COST					
	Land for Disposal Areas	Acres	2500	2	5,000
	Construct Dikes and Weirs	LS	Job		18,900
	Dredging for Access and Mooring	CY	2.17	500	1,100
	Subtotal				25,000
	Contingencies (25%)				6,200
	Subtotal				31,200
	Engineering and Design				2,500
	Supervision and Administration				1,700
	TOTAL NON-FEDERAL CONSTRUCTION COST				35,400
	Local Share of Initial Cost				13,400
	TOTAL NON-FEDERAL FIRST COST				48,800
	TOTAL INITIAL PROJECT COST				\$185,800

ALTERNATIVE 1A - UNSTABILIZED CHANNEL (CONTINUED)  
 6- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
INITIAL FEDERAL COST				\$137,000
INTEREST DURING CONSTRUCTION				500
TOTAL INVESTMENT				137,500
FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				12,400
Maintenance Dredging	CY	2.17	181,200	393,200
Mobilization and Demobilization	LS	20000	1	20,000
Navigation Aids Maintenance	LS	Job	1	2,100
TOTAL ANNUAL FEDERAL CHARGES				427,700
INITIAL LOCAL COST				48,400
INTEREST DURING CONSTRUCTION				200
TOTAL INVESTMENT				48,600
NON-FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				4,400
Maintenance Dredging of Berths				1,000
Dike Maintenance				1,000
TOTAL ANNUAL NON-FEDERAL CHARGES				6,400
TOTAL ANNUAL CHARGES				\$434,100
Less Present Costs of Operations				50,000
NET ANNUAL CHARGES				\$384,100

ALTERNATIVE 1B - UNSTABILIZED CHANNEL WITH IMPOUNDMENT AREA  
6- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
INITIAL COSTS

		Unit	Unit Cost(\$)	Quantity	Total Cost
Item		Unit			
-----					
FEDERAL FIRST COST					
09	CHANNELS				
	Dredging - Inlet Channel	CY	2.17	12000	26,000
	- Canal Channel	CY	2.17	22300	48,400
	- Impoundment Areas	CY	2.17	18000	39,100
	Mobilization and Demobilization	LS	Job	1	20,000
	Subtotal				133,500
	Contingencies (25%)				33,400
	Subtotal Channels				166,900
30	ENGINEERING AND DESIGN				13,400
31	SUPERVISION AND ADMINISTRATION				9,200
	Subtotal				189,500
	Non-Federal Contribution (10%)				11,800
	TOTAL CORPS OF ENGINEERS FIRST COST				170,500
	OTHER FEDERAL AGENCIES				
	Navigation Aids (USCG)	LS	Job	1	16,000
	TOTAL FEDERAL FIRST COST				186,500
NON-FEDERAL FIRST COST					
	Land for Disposal Areas	Acres	2500	2	5,000
	Construct Dikes and Weirs	LS	Job		18,900
	Dredging for Access and Mooring	CY	2.17	500	1,100
	Subtotal				25,000
	Contingencies (25%)				6,200
	Subtotal				31,200
	Engineering and Design				2,500
	Supervision and Administration				1,700
	TOTAL NON-FEDERAL CONSTRUCTION COST				35,400
	Local Share of Initial Cost				18,900
	TOTAL NON-FEDERAL FIRST COST				54,300
	TOTAL INITIAL PROJECT COST				\$240,800

ALTERNATIVE 1B - UNSTABILIZED CHANNEL WITH IMPOUNDMENT AREA (CONTINUED)  
 (6- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES)  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
INITIAL FEDERAL COST				\$186,500
INTEREST DURING CONSTRUCTION				700
TOTAL INVESTMENT				187,200
FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				16,900
Maintenance Dredging	CY	2.17	181,200	393,200
Mobilization and Demobilization	LS	20000	4	80,000
Navigation Aids Maintenance	LS	Job	1	2,100
TOTAL ANNUAL FEDERAL CHARGES				492,200
INITIAL LOCAL COST				54,300
INTEREST DURING CONSTRUCTION				200
TOTAL INVESTMENT				54,500
NON-FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				4,900
Maintenance Dredging of Berths				1,000
Dike Maintenance				1,000
TOTAL ANNUAL NON-FEDERAL CHARGES				6,900
TOTAL ANNUAL CHARGES				\$499,100
Less Present Costs of Operation				50,000
NET ANNUAL CHARGES				\$449,100

ALTERNATIVE 1C - UNSTABILIZED CHANNEL WITH FIXED SAND BYPASSING UNIT  
6- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
INITIAL COSTS

		Unit	Unit	Quantity	Total
Item		Cost(\$)			Cost
-----					
FEDERAL FIRST COST					
09	CHANNELS				
	Dredging - Inlet Channel	CY	2.17	12000	\$26,000
	- Pump Installation	CY	2.17	23000	49,900
	- Impoundment Areas	CY	2.17	6000	13,000
	- Canal Channel	CY	2.17	22300	48,400
	Mobilization and Demobilization	LS			20,000
	Subtotal Dredging				157,300
	Sand Bypassing Equipment				
	Jet Pump, 4" x 4" x 6"	Each	4500.00	6	27,000
	8" Dia. Water line, SCH 40"	LS	24.20	3300	79,900
	8" Dia. Slurry line, SCH 40"	LF	24.20	4000	96,800
	Centrifugal Pump, 150 HP Elect.	LS			11,900
	Pump house, CM4, 20' x 20'	LS			22,000
	Valves, Fittings, Misc.	LS			4,400
	Overhead, Profit, Bond (26%)				62,900
	Subtotal Equipment				304,900
	Subtotal Channels				462,200
	Contingencies (25%)				115,600
	Subtotal				577,800
30	ENGINEERING AND DESIGN				46,200
31	SUPERVISION AND ADMINISTRATION				31,800
	TOTAL INITIAL COST				655,800
	Non-Federal Contribution				65,600
	Federal Share of Initial Cost				590,200
	OTHER FEDERAL AGENCIES				
	Navigation Aids (USCG)	LS			16,000
	TOTAL FEDERAL FIRST COST				\$606,200

ALTERNATIVE 1C - UNSTABILIZED CHANNEL WITH FIXED SAND BYPASSING UNIT (CONTD)  
 6- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
INITIAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
NON-FEDERAL FIRST COST				
Land for Disposal Areas	Acres	2500	2	\$ 5,000
Construct Dikes and Weirs	LS	Job		18,900
Dredging for Access and Mooring	CY	2.17	500	1,100
Subtotal				25,000
Contingencies (25%)				6,200
Subtotal				31,200
Engineering and Design				2,500
Supervision and Administration				1,700
TOTAL NON-FEDERAL CONSTRUCTION COST				35,400
Local Share of Initial Cost				65,600
TOTAL NON-FEDERAL FIRST COST				101,000
TOTAL INITIAL PROJECT COST				\$707,200

ALTERNATIVE 1C - UNSTABILIZED CHANNEL WITH FIXED SAND BYPASSING UNIT (CONTD)  
 6- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
INITIAL FEDERAL COST				\$606,200
INTEREST DURING CONSTRUCTION				6,700
TOTAL INVESTMENT				612,900
FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				55,200
Average Annual Operation and Maintenance Cost				
Labor	Hours	17.60	3400	59,800
Electric Power 150 HP (KW)	KWH	0.072	510,000	36,700
Vehicle and Tools	LS			6,600
Subtotal Operation				103,100
Annual Replacement Costs				
Water line (1500 ft/3 yr)				12,000
Slurry line (2000 ft/2yr)				34,000
Pump house (Replace after 25 yr)				1,100
Pumps, motors, misc.				6,500
Subtotal Replacement				53,600
Maintenance Dredging				
Inlet Channel	CY	2.17	8000	17,400
Impoundment Areas	CY	2.17	12000	26,000
Canal Channel	CY	2.17	2000	4,300
Mobilization and Demobilization	LS	20000	2	40,000
Subtotal Dredging				87,700
Subtotal Annual Operation and Maintenance				299,600
Contingencies (25%)				39,200
Supervision and Administration				23,500
Subtotal				362,300
OTHER FEDERAL AGENCIES				
Navigation Aids Maintenance				2,100
TOTAL ANNUAL FEDERAL CHARGES				\$364,400

ALTERNATIVE 1C - UNSTABILIZED CHANNEL WITH FIXED SAND BYPASSING UNIT (CONTD)  
 6- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
INITIAL LOCAL COST				\$101,000
INTEREST DURING CONSTRUCTION				1,100
TOTAL INVESTMENT				102,100
NON-FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				9,200
Maintenance Dredging of Berths				1,000
Dike Maintenance				1,000
TOTAL ANNUAL NON-FEDERAL CHARGES				11,200
TOTAL ANNUAL CHARGES				\$375,600
Less Present Costs of Operation				50,000
NET ANNUAL CHARGES				\$325,600

ALTERNATIVE 2A - STABILIZED CHANNEL  
6- BY 100-FOOT INLET CHANNEL WITH DUAL JETTIES  
INITIAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
<b>FEDERAL FIRST COST</b>				
<b>09 CHANNELS</b>				
Dredging - Entrance Channel	CY	2.17	12000	\$26,000
- Canal Channel	CY	2.17	22300	48,400
- West Impoundment	CY	2.17	65000	141,000
Mobilization and Demobilization	LS	Job	1	20,000
Subtotal Dredging				235,400
Jetty Construction				
Rubble Removal	CY	9.50	3000	28,500
West Jetty Quarry Stone	Ton	30.00	11650	349,500
East Jetty Quarry Stone	Ton	30.00	6850	205,500
Mobilization and Demobilization	LS			25,000
Subtotal Jetties				608,500
Subtotal Channels				843,900
Contingencies (25%)				211,000
TOTAL CHANNELS				1,054,900
30 ENGINEERING AND DESIGN				84,400
31 SUPERVISION AND ADMINISTRATION				58,000
TOTAL INITIAL COST				1,197,300
Non-Federal Contribution (10%)				119,700
TOTAL CORPS OF ENGINEERS FIRST COST				1,077,600
OTHER FEDERAL AGENCIES				
Navigation Aids (USCG)	LS	Job	1	16,000
TOTAL FEDERAL FIRST COST				\$1,093,600

ALTERNATIVE 2A - STABILIZED CHANNEL (CONTINUED)  
 6- BY 100-FOOT INLET CHANNEL WITH DUAL JETTIES  
INITIAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
NON-FEDERAL FIRST COST				
Land for Disposal Areas	Acres	2500	2	\$ 5,000
Construct Dikes and Weirs	LS	Job		18,900
Dredging for Access and Mooring	CY	2.17	500	1,100
Subtotal				25,000
Contingencies (25%)				6,200
Subtotal				31,200
Engineering and Design				2,500
Supervision and Administration				1,700
TOTAL NON-FEDERAL CONSTRUCTION COST				35,400
Local Share of Initial Cost				119,700
TOTAL NON-FEDERAL FIRST COST				155,100
TOTAL INITIAL PROJECT COST				1,248,700

ALTERNATIVE 2A - STABILIZED CHANNEL (CONTINUED)  
 6- BY 100-FOOT INLET CHANNEL WITH DUAL JETTIES  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
-----				
INITIAL FEDERAL COST				\$1,093,600
INTEREST DURING CONSTRUCTION				12,100
TOTAL INVESTMENT				1,105,700
FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				99,500
Maintenance Dredging	CY	2.17	181,200	393,200
Mobilization and Demobilization	LS	20000	1	20,000
Jetty Maintenance	LS			19,000
Navigation Aids Maintenance	LS	Job	1	2,100
TOTAL ANNUAL FEDERAL CHARGES				533,800
INITIAL LOCAL COST				155,100
INTEREST DURING CONSTRUCTION				1,700
TOTAL INVESTMENT				156,800
NON-FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				14,100
Maintenance Dredging of Berths				1,000
Dike Maintenance				1,000
TOTAL ANNUAL NON-FEDERAL CHARGES				16,100
TOTAL ANNUAL CHARGES				\$549,900
Less Present Costs of Operation				50,000
NET ANNUAL CHARGES				\$499,900

ALTERNATIVE 2B - STABILIZED CHANNEL  
6- BY 100-FOOT INLET CHANNEL WITH SINGLE JETTY  
INITIAL COSTS

	Item	Unit	Unit Cost(\$)	Quantity	Total Cost
<b>FEDERAL FIRST COST</b>					
09	<b>CHANNELS</b>				
	Dredging - Entrance Channel	CY	2.17	12000	\$ 26,000
	- Canal Channel	CY	2.17	22300	48,400
	- West Impoundment	CY	2.17	65000	141,000
	- East Impoundment	CY	2.17	7000	15,200
	Mobilization and Demobilization	LS	Job	1	20,000
	Subtotal Dredging				250,600
	<b>Jetty Construction</b>				
	Rubble Removal	CY	9.50	3000	28,500
	West Jetty Quarry Stone	Ton	30.00	11650	349,500
	Mobilization and Demobilization	LS			25,000
	Subtotal Jetty				403,000
	Subtotal Channels				653,600
	Contingencies (25%)				163,400
	<b>TOTAL CHANNELS</b>				817,000
30	<b>ENGINEERING AND DESIGN</b>				
					65,400
31	<b>SUPERVISION AND ADMINISTRATION</b>				
					44,900
	Subtotal				927,300
	Non-Federal Contribution (10%)				92,700
	<b>TOTAL CORPS OF ENGINEER FIRST COST</b>				834,600
	<b>OTHER FEDERAL AGENCIES</b>				
	Navigation Aids (USCG)	LS	Job	1	16,000
	<b>TOTAL FEDERAL FIRST COST</b>				\$850,600

ALTERNATIVE 2B - STABILIZED CHANNEL (CONTINUED)  
 6- BY 100-FOOT INLET CHANNEL WITH SINGLE JETTY  
INITIAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
NON-FEDERAL FIRST COST				
Land for Disposal Areas	Acres	2500	2	\$ 5,000
Construct Dikes and Weirs	LS	Job		18,900
Dredging for Access and Mooring	CY	2.17	500	1,100
Subtotal				25,000
Contingencies (25%)				6,200
Subtotal				31,200
Engineering and Design				2,500
Supervision and Administration				1,700
TOTAL NON-FEDERAL CONSTRUCTION COST				35,400
Local Share of Initial Cost				92,100
TOTAL NON-FEDERAL FIRST COST				128,100
TOTAL INITIAL PROJECT COST				\$978,700

ALTERNATIVE 2B - STABILIZED CHANNEL (CONTINUED)  
 6- BY 100-FOOT INLET CHANNEL WITH SINGLE JETTY  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
INITIAL FEDERAL COST				\$850,600
INTEREST DURING CONSTRUCTION				7,900
TOTAL INVESTMENT				858,500
FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				77,300
Maintenance Dredging	CY	2.17	181,200	393,200
Mobilization and Demobilization	LS	20000	1	20,000
Jetty Maintenance	LS			10,300
Navigation Aids Maintenance	LS	Job	1	2,100
TOTAL ANNUAL FEDERAL CHARGES				502,900
INITIAL LOCAL COST				128,100
INTEREST DURING CONSTRUCTION				1,200
TOTAL INVESTMENT				129,300
NON-FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				11,600
Maintenance Dredging of Berths				1,000
Dike Maintenance				1,000
TOTAL ANNUAL NON-FEDERAL CHARGES				13,600
TOTAL ANNUAL CHARGES				\$516,500
Less Present Costs of Operation				50,000
NET ANNUAL CHARGES				\$466,500

ALTERNATIVE 3 - CHANNEL STABILIZED BY CONSTANT DREDGING  
 5- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
 CONTRACT DREDGE - 12 MONTH OPERATION  
INITIAL COSTS

	Item	Unit	Unit Cost(\$)	Quantity	Total Cost
-----					
FEDERAL FIRST COST					
09	CHANNELS				
	Initial Dredging - Inlet Channel	CY	2.78	7500	\$20,800
	- Canal Channel	CY	2.78	2000	5,600
	Mobilization and Demobilization	(1/year included in annual cost)			
	Subtotal			26,400	
	Contingencies (25%)				6,600
	Subtotal channels				33,000
30	ENGINEERING AND DESIGN				54,700
31	SUPERVISION AND ADMINISTRATION				37,500
	Subtotal				\$125,200
	Non-Federal Contribution (10%)				12,500
	TOTAL CORPS OF ENGINEERS FIRST COST				\$112,700
	OTHER FEDERAL AGENCIES				
	Navigation Aids (USCG)	LS	Job	1	\$16,000
TOTAL FEDERAL FIRST COST					\$128,700
NON-FEDERAL FIRST COST					
	Land for Disposal Areas	Acres	2500	2	5,000
	Construct Dikes and Weirs	LS	Job		18,900
	Dredging for Access and Mooring	CY	2.78	500	1,400
	Subtotal				25,300
	Contingencies (25%)				6,300
	Subtotal				31,600
	Engineering and Design				2,500
	Supervision and Administration				1,700
	Subtotal construction cost				\$35,800
	Non-Federal Contribution to Initial Cost				\$12,500
TOTAL NON-FEDERAL FIRST COST					\$48,300
TOTAL INITIAL COST					\$177,000

ALTERNATIVE 3 - CHANNEL STABILIZED BY CONSTANT DREDGING  
 5- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
 CONTRACT DREDGE - 12 MONTH OPERATION  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
FEDERAL ANNUAL CHARGE				
Maintenance Dredging				
Inlet Channel	CY	2.78	181200	\$503,700
Canal Channel	CY	2.78	2000	5,600
Mobilization and Demobilization (1/year)				20,700
Subtotal				530,000
Contingencies (25%)				132,500
Subtotal Annual Maintenance				\$662,500
Interest and Amortization at 8 7/8%				11,600
OTHER FEDERAL AGENCIES				
Navigation Aids (USCG)	LS	Job	1	2,100
TOTAL ANNUAL FEDERAL CHARGES				\$676,200
NON-FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				4,300
Maintenance Dredging of Berths				1,000
Dike Maintenance				1,000
TOTAL ANNUAL NON-FEDERAL CHARGES				6,300
TOTAL ANNUAL CHARGES				682,500
Less Present Costs of Operations				50,000
NET ANNUAL CHARGES				\$632,500

ALTERNATIVE 3A - CHANNEL STABILIZED BY CONSTANT DREDGING  
 5- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
 CONTRACT DREDGE - 8 MONTH OPERATION  
INITIAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
<b>FEDERAL FIRST COST</b>				
30	ENGINEERING AND DESIGN			54,700
31	SUPERVISION AND ADMINISTRATION			37,500
	Subtotal			92,200
	Non-Federal Contribution (10%)			9,200
	Federal Share of Initial Cost			83,000
<b>OTHER FEDERAL AGENCIES</b>				
	Navigation Aids (USCG)	LS	Job 1	16,000
<b>TOTAL FEDERAL FIRST COST</b>				<b>99,000</b>
<b>NON-FEDERAL FIRST COST</b>				
	Land for Disposal Areas	Acres	2500 2	5,000
	Construct Dikes and Weirs	LS	Job	18,900
	Dredging for Access and Mooring	CY	2.78 500	1,400
	Subtotal			25,300
	Contingencies (25%)			6,300
	Subtotal			31,600
	Engineering and Design			2,500
	Supervision and Administration			1,700
	Subtotal construction cost			35,800
	Non-Federal Construction Initial Cost			9,200
<b>TOTAL NON-FEDERAL FIRST COST</b>				<b>\$ 45,000</b>
<b>TOTAL INITIAL COST</b>				<b>\$144,800</b>

ALTERNATIVE 3A - CHANNEL STABILIZED BY CONSTANT DREDGING  
 5- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
 CONTRACT DREDGE - 8 MONTH OPERATION  
ANNUAL COSTS

		Unit	Unit Cost(\$)	Quantity	Total Cost
Item		Unit			
FEDERAL ANNUAL CHARGES					
09	CHANNELS				
	Mobilization and Demobilization	(1/year)			20,000
	Annual Startup - Inlet Channel	CY	3.13	7500	23,500
	- Canal Channel	CY	3.13	2000	6,300
	Continued Maintenance - Inlet	CY	3.13	95500	298,900
	- Canal	CY	3.13	2000	6,300
	Subtotal				
355,000	Contingencies (25%)				88,800
	TOTAL ANNUAL DREDGING				\$443,800
	Interest and Amortization at 8-7/8%				8,000
	OTHER FEDERAL AGENCIES				
	Navigation Aids (USCG)	LS	Job	1	2,100
	TOTAL ANNUAL FEDERAL CHARGES				\$453,900
NON-FEDERAL ANNUAL CHARGES					
	Interest and Amortization at 8-7/8%				4,100
	Maintenance Dredging of Berths				1,000
	Dike Maintenance				1,000
	TOTAL ANNUAL NON-FEDERAL CHARGES				\$ 6,100
	TOTAL ANNUAL CHARGES				\$460,000
	Less Present Costs of Operations				50,000
	NET ANNUAL CHARGES				\$410,000

ALTERNATIVE 4 - CHANNEL STABILIZED BY CONSTANT DREDGING  
 5- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
 DEDICATED DREDGE - 12 MONTH OPERATION  
INITIAL COSTS

	Item	Unit	Unit Cost(\$)	Quantity	Total Cost
-----					
FEDERAL FIRST COST					
09	CHANNELS				
	Initial Dredging - Inlet Channel	CY	1.11	7500	8,300
	- Canal Channel	CY	1.11	2000	2,200
	Subtotal				10,500
	Contingencies (25%)				2,600
	Subtotal channels				\$13,100
20	PERMANENT OPERATING EQUIPMENT				
	Purchase 12-inch Dredge	LS			250,000
	Purchase Support Equipment	LS			52,000
	Subtotal				302,000
	Contingencies (25%)				75,500
	Subtotal equipment				\$377,500
30	ENGINEERING AND DESIGN				54,700
31	SUPERVISION AND ADMINISTRATION				37,500
	TOTAL INITIAL COST (Corps of Engineers)				\$482,800
	OTHER FEDERAL AGENCIES				
	Navigation Aids (USCG)				16,000
	TOTAL FEDERAL CONSTRUCTION COST				\$498,800
	Non-Federal Contribution (10%)				49,900
TOTAL FEDERAL FIRST COST					\$448,900
NON-FEDERAL FIRST COST					
	Land for Disposal Areas	Acres	2500	2	5,000
	Construct Dikes and Weirs	LS	Job		18,900
	Dredging for Access and Mooring	CY	1.11	500	600
	Subtotal				24,500
	Contingencies (25%)				6,100
	Subtotal				30,600
	Engineering and Design				2,500
	Supervision and Administration				1,700
	TOTAL NON-FEDERAL CONSTRUCTION COST				34,800
	Local Share of Initial Cost				49,900
TOTAL NON-FEDERAL FIRST COST					\$ 84,700
TOTAL INITIAL COST					\$533,600

ALTERNATIVE 4 - CHANNEL STABILIZED BY CONSTANT DREDGING  
 5- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
 DEDICATED DREDGE - 12 MONTH OPERATION  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
FEDERAL ANNUAL COSTS				
Dredging - Inlet Channel	CY	1.11	181200	\$201,100
- Canal Channel	CY	1.11	2000	2,200
Subtotal				203,300
Contingencies (25%)				50,800
Subtotal Annual Dredging				\$254,100
Interest and Amortization at 8-7/8%				37,100
OTHER FEDERAL AGENCIES				
Navigation Aids (USCG)	LS	Job	1	2,000
TOTAL ANNUAL FEDERAL CHARGES				\$293,200
NON-FEDERAL ANNUAL CHARGES				
Interest and Amortization at 8-7/8%				7,300
Maintenance Dredging of Berths				1,000
Dike Maintenance				1,000
TOTAL ANNUAL NON-FEDERAL CHARGES				\$ 9,300
TOTAL ANNUAL CHARGES				\$302,500
Less Present Costs of Operations				50,000
NET ANNUAL CHARGES				\$252,500

ALTERNATIVE 4A - CHANNEL STABILIZED BY CONSTANT DREDGING  
 5- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
 DEDICATED DREDGE - 8 MONTH OPERATION  
INITIAL COSTS

Item		Unit	Unit Cost(\$)	Quantity	Total Cost
FEDERAL FIRST COST					
20	PERMANENT OPERATING EQUIPMENT				
	Purchase 10-inch Dredge	LS			250,000
	Purchase Support Equipment	LS			52,000
	Subtotal				302,000
	Contingencies (25%)				75,500
	Subtotal Equipment				\$377,500
30	ENGINEERING AND DESIGN				52,600
31	SUPERVISION AND ADMINISTRATION				36,100
	TOTAL INITIAL COST (Corps of Engineers)				\$466,200
	OTHER FEDERAL AGENCIES				
	Navigation Aids (USCG)				16,000
	TOTAL FEDERAL CONSTRUCTION COST				\$482,200
	Non-Federal Contribution (10%)				48,100
	TOTAL FEDERAL FIRST COST				\$434,100
	NON-FEDERAL FIRST COST				
	Land for Disposal Areas	Acres	2500	2	5,000
	Construct Dikes and Weirs	LS	Job		18,900
	Dredging for Access and Mooring	CY	1.55	500	700
	Contingencies (25%)				6,200
	Subtotal				30,800
	Engineering and Design				2,500
	Supervision and Administration				1,700
	TOTAL NON-FEDERAL CONSTRUCTION COST				35,000
	Local Share of Initial Cost				48,100
	TOTAL NON-FEDERAL FIRST COST				\$ 83,100
	TOTAL INITIAL COST				\$517,200

ALTERNATIVE 4A - CHANNEL STABILIZED BY CONSTANT DREDGING  
 5- BY 100-FOOT INLET CHANNEL WITHOUT JETTIES  
 DEDICATED DREDGE - 8 MONTH OPERATION  
ANNUAL COSTS

Item	Unit	Unit Cost(\$)	Quantity	Total Cost
<b>FEDERAL ANNUAL CHARGE</b>				
Maintenance				
Annual Startup - Inlet Channel	CY	1.55	7500	11,600
- Canal Channel	CY	1.55	2000	3,100
Maintenance - Inlet	CY	1.55	95500	148,000
- Canal	CY	1.55	2000	3,100
Subtotal				162,700
Contingencies (25%)				40,700
Subtotal of Annual Dredging				\$203,400
Interest and Amortization at 8-7/8%				41,600
Federal Share of Major Replacement				2,900
OTHER FEDERAL AGENCIES				
Navigation Aids Maintenance	LS		Job 1	2,100
TOTAL ANNUAL FEDERAL CHARGES				\$250,000
<b>NON-FEDERAL ANNUAL CHARGES</b>				
Interest and Amortization at 8-7/8%				8,000
Local Share of Major Replacement				300
Maintenance Dredging of Berths				1,100
Dike Maintenance				1,100
TOTAL ANNUAL NON-FEDERAL CHARGES				\$ 10,300
TOTAL ANNUAL CHARGES				\$260,300
Less Present Costs of Operations				50,000
NET ANNUAL CHARGES				\$210,300

MEXICO BEACH, FLORIDA

APPENDIX E  
ENVIRONMENTAL CORRESPONDENCE

MEXICO BEACH, FLORIDA

APPENDIX E  
ENVIRONMENTAL CORRESPONDENCE

Table of Contents

<u>Item</u>	<u>Page</u>
COBRA Coastal Barrier Resources System Consistency	E-1
Resource Assessment	E-3



# United States Department of the Interior

FISH AND WILDLIFE SERVICE

75 SPRING STREET, S.W.

ATLANTA, GEORGIA 30303

PD-IV  
PD-ES  
R

MAR 26 1985

Mr. Lawrence R. Green  
Chief, Planning Division  
U.S. Army Corps of Engineers  
Post Office Box 2288  
Mobile, Alabama 36628

Dear Mr. Green:

This letter provides consultation in response to your February 5, 1985, letter requesting such consultation under the Coastal Barrier Resources Act for an action affecting the St. Andrew Complex (Unit P 31) of the Coastal Barrier Resources System. These comments are made pursuant to the review responsibilities of the Fish and Wildlife Service as delegated by the Secretary of the Interior, relative to Section 6 of the CBRA.

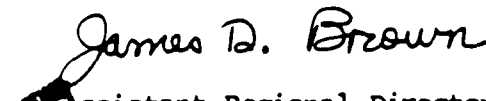
Your request is for disposal of material dredged from the Mexico Beach canal as part of a Corps of Engineers navigation project, and placement of this material on a CBRS dune area (estimated 2 to 3 acres in size).

The dune-like portion of the CBRS involved has previously been affected by spoil disposal; and human beach-associated recreational activity at the site is high. Hence, wildlife values at the site are limited. The proposed disposal appears unlikely to adversely affect scenic, scientific, recreational, natural, historic, archeological, cultural, or economic resources. Disposal may help protect these resources from beach erosion through nourishment of the dune zone. Site inspections of the Unit by Service biologists have been made in conjunction with the Corps project investigations.

Sections 6(a)(6)(A) and 6(a)(6)(O) provide exceptions to Section 5 (Limitations of Federal Expenditures Affecting the System), if the expenditures are for recreational projects, and nonstructural projects for shoreline stabilization that are designed to mimic, enhance, or restore natural stabilization systems, respectively. The purpose of CBRA is to minimize the loss of human life, wasteful expenditure of Federal revenues, and damage to fish, wildlife and other natural

resources associated with coastal barriers. The proposed action is compatible with this purpose. Therefore, it is our conclusion that this proposed action is an exception under Sections 6(a)(6)(A) and 6(a)(6)(O) of the CERA.

Sincerely yours,

  
Assistant Regional Director—  
Habitat Resources



United States Department of the Interior  
FISH AND WILDLIFE SERVICE

Division of Ecological Services  
1612 June Avenue  
Panama City, Florida 32405

February 26, 1985

District Engineer  
U.S. Army Corps of Engineers  
P.O. Box 2288  
Mobile, Alabama 36628

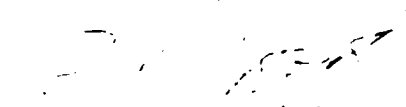
Attention: Coastal Branch

Dear Sir:

In accordance with the December 31, 1984 Scope of Work update attached is a copy of the Salt Creek Inlet Resource Assessment. The Resource Assessment is an abbreviated form of the Resource Inventory normally provided for larger projects.

This concludes our activity on the Resource Inventory portion of this project.

Sincerely,

  
James M. Barkuloo  
Field Supervisor

enclosures

GWH:bp  
1985

# memorandum

January 23, 1985

DATE:

REPLY TO  
ATTN OF:

Acting Field Supervisor, Endangered Species Field Station,  
Jacksonville, Florida

SUBJECT:

Endangered Species Concerns with Reference to the Salt  
Creek Inlet Project, Mexico Beach, Florida

TO:

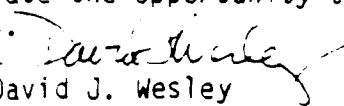
Field Supervisor, Ecological Services, Panama City

This is in response to your letter of November 20, 1984, requesting information on the above mentioned project. We apologize for not responding sooner, but as we mentioned, we don't remember seeing the first letter.

Within the area of influence of this project, the only threatened and endangered species that may be found are the manatee and loggerhead and leatherback sea turtles. This area is outside of the range of the Choctawhatchee beach mouse. With reference to potential impacts, if the proposed work is done during the winter months, neither manatees or nesting turtles should be affected. We have no information relative to manatee use within this channel, but this is not to say that manatees are not found within this area from time to time. If the work is to take place during the summer months, the following precautions should be included in the COE's contract: the Corps or Contractor will monitor and instruct all personnel associated with the construction of the project about the presence of manatees in the area and the need to avoid collisions. All vessels associated with the project will be required to operate at "no wake" speeds at all times while in shallow waters, or channels, where the draft of the boat provides less than 3 feet clearance of the bottom. Boats used to transport personnel will be shallowdraft vessels, preferably of the light-displacement category, where navigational safety permits. Vessels transporting personnel between the landing and the dredge shall follow routes of deep water to the extent possible. The Corps or Contractor will brief their personnel concerning the civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Endangered Species Act and the Marine Mammal Protection Act. The Corps or Contractor will be held responsible for any manatee harmed, harassed, or killed as a result of the construction of the project. The Corps or Contractor will keep a log detailing all sightings, collisions, damage, or killing of manatees and/or sea turtles which have occurred during the maintenance dredging period. Any collision with a manatee resulting in death or injury to the animal shall be reported immediately to the Corps' Environment and Resources Branch for Contractor work and to the Jacksonville Endangered Species Field Station so the appropriate course of action can be taken. Following project completion, the Corps will submit a report summarizing the above incidents to the U.S. Fish and Wildlife Service.

Insofar as turtles are concerned, it is possible that turtles do nest on the stretch of beach that is proposed for disposal. Again we do not have any data. However, if the project is to take place during the nesting season, May to September, then we suggest that the COE contract with a licensed individual by the Florida Department of Natural Resources, to monitor the affected beach, and relocate turtle nests if necessary. The monitoring work should be initiated 60 days prior to beach disposal. If the COE accepts these precautions, then we will be in a position to concur with a "no affect" determination.

Other than these two comments, we do not have any additional comments to make at this time. We appreciate the opportunity to provide comments on this proposed project.

  
David J. Wesley

Resource Assessment  
Salt Creek Inlet  
Mexico Beach, Florida

The following Resource Assessment for navigation improvements of Mexico Beach, Florida (Salt Creek) is provided in accordance with the fiscal year 1985 funding agreement between Mobile District, U.S. Army Corps of Engineers and the Panama City, Florida Ecological Services of the U.S. Fish and Wildlife Service. This report is considered an early planning aid document funded and developed in keeping with the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.).

The purpose of this document is to identify significant fish and wildlife resources in the project area and to provide early information on how damages can best be avoided.

Description of Area

Mexico Beach is a small recreation and retirement community located about 29 miles southeast of Panama City and about 9 miles Northwest of Port Saint Joe. The town is located along the beach on both sides of U.S. Highway 98.

The lower portion of a small creek historically known as Salt Creek, located on the west end of the town has been dredged out and developed to accomodate 3 marinas and over 100 boat moorages. A major part of the local economy is based on the sport fishery and a minor part on the commercial fishery of the Gulf of Mexico which is accessed through the mouth of Salt Creek.

The formation of sand bars across the mouths of creeks and small rivers is a severe problem to boaters along the Gulf of Mexico. Some rivers and creeks maintain suitable navigation depths at their mouths because discharges are great enough to keep a sand bar from forming. Salt Creek's very small drainage area (probably less than 20 square miles) provides little runoff. As a result a sand bar periodically forms across the mouth reducing the water depth to a point where all but very shallow draft vessels are kept from passing during low tide stages.

Being a freshwater stream, Salt Creek historically supported a limited warm water sport fish population composed of largemouth bass, redear sunfish, bluegill, and warmouth. Small populations still exist in the upper portions of the system, however, past modification of the stream channel, construction of a weir, and permanent maintenance of the opening at the mouth of the creek has resulted in substantial reduction of the freshwater habitat, and creation of an estuarine type of habitat in the project area. That habitat is now better suited for the support of seatrout, croaker, redfish, mullet, flounder, and crabs. In the cold months large seatrout and young redfish seek shelter in the dredged out creek channel and marina access channel. During this period they are heavily harvested by sport fisherman. Marine shoreline fishes that might be expected to be found around the mouth of Salt Creek would be pompano, whiting, blue runner, blue fish, spanish mackerel, seatrout, redfish, black drum, croaker, mullet, and flounder. Jack cravelle, cobia, king mackerel, snapper, little tunny (locally called bonito), amberjack and grouper make up the majority of the fishery immediately offshore of Mexico Beach.

These are the target species for the charter boats that operate out of the marinas along Salt Creek.

2 The only marine mammals expected to be utilizing the project area is the bottlenose dolphin. Bottlenose dolphin often cruise the surf zone's outer edge preying on various fishes.

2 Loggerhead sea turtles nest on beaches in the vicinity of Salt Creek, however, such use is now very limited because of human development and disturbance.

3 A variety of migratory and wading birds, including some waterfowl, seasonally frequent the project area. The most commonly seen waterfowl would be the ring-necked duck, lesser scaup, and redhead duck. Other water related birds include the king fisher, ring-billed gull, herring gull, great blue heron, snowy egret, double-crested cormorant and the Federally Endangered brown pelican.

3 Terrestrial mammals that are most likely to be found in the project area are whitetail deer, marsh rabbit, raccoon, striped skunk and opossum. These animals could be expected to utilize the habitats of the spoil sites, with greatest use occurring at sites C, D and E (see sites identified in the C.O.E. Reconnaissance report).

A more comprehensive list of fish, birds, and mammals likely to be seen in the area, and their occurrence is included as an appendix.

Project Proposal - To insure the continued accessability of the marina and moorage facilities to the Gulf of Mexico it is proposed that the Salt Creek entrance be modified to eliminate continual formation of a bar across the mouth. Also, about 3600' of the creek and marina channel would be dredged to about 6 feet below mean low tide, thereby assuring unrestricted access of vessels to and from the Gulf and reducing the frequency of maintenance dredging.

The channel width would be maintained at a minimum of 50' within the creek mouth, and 8' deep and 100' wide outside the mouth. Construction of a jetty at the mouth of the creek could be a major element of the plan. Should the jetty be constructed it would extend about 300 feet seaward to a depth of 6' below mean low water.

Disposal of dredged materials is probably the most problematic element of the plan when considering fish and wildlife impacts. The project survey investigation document dated January 3, 1983 identifies 5 disposal sites. Site A is located at a heavily eroded area on the beach and is considered a good location for disposal of clean sand. Area B is just behind the beach in what is considered the primary dune area. This disposal site would, again be suitable only for clean sand disposal. Site C is located in the transitional area probably best typified as coastal berm. This area, characterized by salt tolerant plant species would be suitable for disposal of dredge materials composed of sand and fines, provided the materials are contained in a manner that would not allow them to escape to the beach area. Disposal areas D and E are located in disturbed forested uplands well back from the white sand beachfront

and are most suitable for disposal of the highly organic materials that are expected to be dredged from the existing marina access channel. Although there are some low wet areas in disposal site E, they appear to have been severely disturbed and isolated by past land use practices, and are therefore presently not of significant value to the system other than providing filtration to waters percolating into the creek channel.

#### Possible Impacts to Fish and Wildlife

The most obvious negative impacts related to this project would result from changing of the habitat within the channel (dredging) and at the disposal areas (filling).

Presently the channel in the vicinity of the marina serves as fall and winter habitat for large speckled trout and juvenile redbfish. The fish move into the area from the Gulf of Mexico when water temperatures drop in the fall and move out as temperatures increase in the spring. Since the channel is heavily utilized by these highly prized food and sport fish it is important that the habitat is adequately protected. This can best be done by making sure that the proposed project is designed in such a manner as to eliminate any chance that anaerobic conditions might develop. Such conditions usually occur as a result of sumps or low spots being located where detritus and other organic materials can accumulate and cause an oxygen deficient condition. Such places are inhabitable by fish and may, in fact, result in fish kills if and when the materials are mixed into the water column. Proper design of the channel bottom would eliminate the possibility of any such occurrence.

The other potential for negative impacts would be at the spoil sites. Deposition of dredge materials would eliminate a given amount of forested shrub/brush, and disturbed wetland habitat thereby eliminating or greatly reducing use by the previously listed mammals. Although, based on the identified spoil sites, it appears that such impacts would be minor we believe these could be minimized by planning in such a manner as to provide for spoil of future maintenance operations in the same locations. This could easily be achieved if sites C, D, and E were utilized as fill stockpiles from which private and public fill material demands of the outlying area were met. In that manner the identified spoil areas would be available for future disposal of maintenance dredge materials.

#### Positive Impacts

Construction of the jetty would considerably enhance the sport fishing opportunities of shoreline fishermen in Mexico Beach. Jetties usually are congregation areas for pompano, whiting, Atlantic croaker, redfish, sheepshead, flounder, bluefish, spanish mackerel and cobia. Since there is very little shoreline structure available to fish from in the Mexico Beach area it can be expected that construction of jetties will provide substantial shore fisherman benefits. Other obvious positive impacts would be the assurance of safe access to offshore fishing grounds, and provision of a safe harbor for fishing boats during periods of bad weather.

#### Endangered Species

Please see the attached memo dated January 23, 1985 from the Acting Field Supervisor, Endangered Species Field Station, Jacksonville, Florida.

## Special Problems

In the course of our investigations we have determined that the beach front and lands immediately west of the Salt Creek channel and south of the Highway 98 bridge are designated as lands to be protected under the Coastal Barrier Resources Act of 1982 (CBRA). The law (Pub. L. 97-348) states, in part, that new federal construction on lands within the system is illegal unless exempted. It appears that spoil site B is located within the boundaries of the system, therefore any Federal activity and/or expenditure of Federal funds that would affect the site must 1) meet exemption criteria and 2) be formally processed for exemption.

Exemption under section 6 of the CBRA is acquired through consultation with the U.S. Fish and Wildlife Service provided the proposed activity is in keeping with the purpose and intent of the Act. We believe spoiling of initial, clean sand dredge materials at spoil site B could be exempted provided the spoiling were accomplished in a manner that would restore and/or replenish the natural dune system.

In order to avoid delays in later planning stages, we suggest the U.S. Army Corps of Engineers, Mobile District initiate consultation on this matter as early as possible.

Further information regarding consultation procedures may be obtained by contacting this office or Ron Haynes CBRA Regional Coordinator, U.S. Fish and Wildlife Service, Atlanta Regional Office, FTS 292-6379.

### Summary

In general it appears the project would improve access to the Gulf of Mexico by sport fishing and commercial fishing vessels with little additional impact to the fish and wildlife resources of the area provided initial and maintenance dredge materials are properly disposed of. The Fish and Wildlife Service therefore believes development of the project within the limits defined in the January 3, 1983 Mexico Beach, Florida Reconnaissance Report would be in the best overall interest of the general public. We therefore support the proposal for navigation improvement.

Table 1 - Important Fish species expected to utilize habitat available at the project site, Mexico Beach, Bay County, Florida. Codes are as follows - Season: Sp, Spring; Su, Summer; Fa, Fall; Wi, Winter. Relative abundance; A, abundant; C, common; O, occasional; R, rare

Common Name (Scientific name)	Relative Abundance			
	Sp	Su	Fa	Wi
<u>Marine Fishes</u>				
Blacktip shark ( <u>Carcharhinus limbatus</u> )	O	O	O	O
Atlantic stingray, ( <u>Dasyatis sabina</u> )	C	C	C	C
Lady fish ( <u>Elops saurus</u> )	C	A	A	O
Tarpon ( <u>Megalops atlanticus</u> )	C	C	C	O
Gulf menhaden ( <u>Brevoortia patronus</u> )	A	A	A	C
Inshore lizardfish ( <u>Synodus foetens</u> )	C	C	C	C
Hardhead catfish ( <u>Arius felis</u> )	A	A	A	A
Sheepshead minnow ( <u>Cyprinodon variegatus</u> )	A	A	A	A
Gulf killfish ( <u>Fundulus grandis</u> )	A	A	A	A
Longnose killfish ( <u>Fundulus similis</u> )	C	C	C	C
Mosquitofish ( <u>Gambusia affinis</u> )	A	A	A	A
Bluefish ( <u>Pomatomus saltatrix</u> )	A	A	A	C
Cobia ( <u>Rachycentron canadum</u> )	A	O	C	
Blue runner ( <u>Caranx crysos</u> )	A	A	A	R
Creville jack ( <u>Caranx hippos</u> )	C	C	C	O
Leatherjacket ( <u>Oligoplites saurus</u> )	A	A	A	O
Florida pompano ( <u>Trachinotus carolinus</u> )	A	O	A	O
Gray snapper ( <u>Lutjanus griseus</u> )	C	C	C	O
Spotfin mojarra ( <u>Eucinostomus argenteus</u> )	C	C	C	C
Pigfish ( <u>Orthopristis chrysoptera</u> )	A	A	A	A
Sheepshead ( <u>Archosargus probatocephalus</u> )	A	A	A	A

## Relative Abundance

Sp Su Fa Wi

Common Name (Scientific name)

(Marine Fishes - continued)

Pinfish ( <u>Lagodon rhomboides</u> )	A	A	A	A
Silver perch ( <u>Bairdiella chrysoura</u> )	C	C	C	C
Sand seatrout ( <u>Cynoscion arenarius</u> )	A	A	A	C
Spotted seatrout ( <u>Cynoscion nebulosus</u> )	A	A	A	A
Gulf kingfish ( <u>Menticirrhus littoralis</u> )	C	C	C	C
Atlantic croaker ( <u>Micropogonias undulatus</u> )	A	A	A	A
Black drum ( <u>Pogonias cromis</u> )	C	O	O	C
Red drum ( <u>Sciaenops ocellata</u> )	C	O	O	C
Striped mullet ( <u>Mugil cephalus</u> )	A	A	A	A
White mullet ( <u>Mugil curema</u> )	C	C	C	C
Little tunny ( <u>Euthynnus alletteratus</u> )	C	C	C	R
King mackerel ( <u>Scomberomorus cavalla</u> )	C	C	C	R
Spanish mackerel ( <u>Scomberomorus maculatus</u> )	A	A	A	C
Gulf flounder ( <u>Paralichthys albigutta</u> )	C	C	C	C
Southern flounder ( <u>Paralichthys lethostigma</u> )	A	A	A	A

Freshwater Fishes

Redear sunfish ( <u>Lepomis microlophus</u> )	C	C	C	C
Bluegill ( <u>Lepomis macrochirus</u> )	A	A	A	A
Warmouth ( <u>Lepomis gulosus</u> )	C	C	C	C
Largemouth bass ( <u>Micropterus salmoides</u> )	C	C	C	C

Table 2 - Important mammals expected to occur at the project site, Mexico Beach, Bay County, Florida. Habitat Types are coded as follows: Pelagic, Pe; Marsh, M; Beach, B; Streams, S; Estimated relative abundance code as follows: Abundant, A; Common, C; Occasional, O.

Species	Habitat Type	Estimated Relative Abundance
Opposum ( <u>Didelphis virginiana</u> )	S	C
Raccoon ( <u>Procyon lotor</u> )	M	C
Striped skunk ( <u>Mephitis mephitis</u> )	M	C
Marsh rabbit ( <u>Sylvilagus palustris</u> )	M	C
Whitetail deer ( <u>Odocoileus virginianus</u> )	M	C
Bottlenose dolphin ( <u>Tursiops truncatus</u> )	Pe	C

**Table 3 - Important birds** expected to occur in the project area, Mexico Beach, Bay County, Florida. Habitat type code as follows: Shore - S; Marsh - M; Water - W; seasonal abundance is coded as follows: Abundant, A; Common, C; Occasional, O. Information in this table combines that from U.S. Fish and Wildlife Service (1979) Bull and Farrand (1977) and National Geographic Society (1983) with observations by Fish and Wildlife Service personnel.

Species	Habitat Type	Relative Abundance Sp-S-F-W
Common loon ( <u>Gavia immer</u> )	S	C-C-C-C
Horned grebe ( <u>Podiceps auritus</u> )	W	C-C-C-A
Pied-billed grebe ( <u>Podilymbus podiceps</u> )	S-W	C-O-A-A
Brown pelican ( <u>Pelicanus occidentalis</u> )	S-W	C-C-C-C
Double-crested cormorant ( <u>Phalacrocorax auritus</u> )	S	A-A-A-A
Great Blue heron ( <u>Ardea herodias</u> )	M	C-C-C-C
Tricolored heron ( <u>Egretta tricolor</u> )	M	A-A-A-A
Green-backed heron ( <u>Butorides striatus</u> )	M	C-C-O-O
Snowy egret ( <u>Egretta thula</u> )	M	A-A-A-A
Great egret ( <u>Casmerodius albus</u> )	M	A-A-A-A
White ibis ( <u>Eudocimus albus</u> )	M	A-A-C-C
Mallard ( <u>Anas platyrhynchos</u> )	W-M	O-O-O-O
Gadwall ( <u>Anas strepera</u> )	W-M	O-O-O-O
Redhead ( <u>Aythya americana</u> )	W	C-O-C-C
Ring-necked duck ( <u>Aythya collaris</u> )	W	C-O-C-C
Greater scaup ( <u>Aythya marila</u> )	W	O-O-C-A
Lesser scaup ( <u>Aythya affinis</u> )	W	O-O-C-A
Red-breasted merganser ( <u>Mergus serrator</u> )	S	C-O-C-C

Species	Habitat Type	Relative Abundance Sp-S-F-W
Clapper rail ( <u>Rallus longirostris</u> )	M	C-C-C-C
American coot ( <u>Fulica americana</u> )	W	C-O-C-C
Semipalmated plover ( <u>Charadrius semipalmatus</u> )	S-M	C-O-C-C
Black-bellied plover ( <u>Pluvialis squatarola</u> )	S-M	C-O-C-C
Willet ( <u>Catoptrophorus semipalmatus</u> )	S-M	C-C-C-C
Short-billed dowitcher ( <u>Limnodromus griseus</u> )	M	C-C-C-C
Common snipe ( <u>Gallinago gallinago</u> )	M	C-O-C-C
Ruddy Turnstone ( <u>Arenaria interpres</u> )	S	C-O-C-O
Dunlin ( <u>Calidris alpina</u> )	S	A-O-A-A
Laughing gull ( <u>Larus atricilla</u> )	M	C-A-C-O
Ring-billed gull ( <u>Larus delawarensis</u> )	S	A-O-A-A
Herring gull ( <u>Larus argentatus</u> )	S	C-O-C-C
Forster's tern ( <u>Sterna forsteri</u> )	M	C-C-C-C
Least tern ( <u>Sterna antillarum</u> )	S	C-C-O-O
Northern harrier ( <u>Circus cyaneus</u> )	M	C-C-C-C
Osprey ( <u>Pandion haliaetus</u> )	S	C-C-C-C
Mourning dove ( <u>Zenaida macroura</u> )	M	C-C-C-O
Belted kingfisher ( <u>Ceryle alcyon</u> )	M	C-C-C-C
Fish crow ( <u>Corvus ossifragus</u> )	M-S	C-C-C-C
Marsh wren ( <u>Cistothorus palustris</u> )	M	C-C-C-C
Sedge wren ( <u>Cistothorus platensis</u> )	M	O-O-C-C
Seaside sparrow ( <u>Ammodramus maritima</u> )	M	C-C-O-O
Red-winged blackbird ( <u>Agelaius phoeniceus</u> )	M	A-A-A-A
Boat-tailed grackle ( <u>Quiscalus major</u> )	M	A-A-A-A

Table 4 - Important Reptiles and amphibians expected to utilize habitat found at the project site, Mexico Beach, Bay County, Florida. Relative Abundance code as follows: Abundant, A; Common, C; Occasional, O; Rare, R. Habitat Type code as follows: Streams, S; Marsh, M; Beach, B; Coastal waters, CW.

Species	Habitat Type	Estimated Relative Abundance
Loggerhead turtle ( <u>Caretta caretta</u> )	B-CW	O
Cottonmouth ( <u>Agkistrodon piscivorus</u> )	S-M	C
Pigmy rattlesnake ( <u>Sistrurus miliaris</u> )	M	C
American alligator ( <u>Alligator mississippiensis</u> )	S-M	C
Gulf Coast toad ( <u>Bufo valliceps</u> )	B	C

Table 5 - Important marine invertebrate species expected to utilize habitat available at the project site, Mexico Beach, Bay County, Florida.  
Codes are as follows - Season: sp, spring; su, summer; fa, fall; wi, winter.  
Relative abundance: A, abundant; C, common.

Common Name	Relative Abundance			
	Sp	Su	Fa	Wi
Striped hermit crab ( <u>Clibanarius vittatus</u> )	A	A	A	A
Flat clawed hermit crab ( <u>Pagurus pollicaris</u> )	A	A	A	A
Blue crab ( <u>Callinectes sapidus</u> )	A	A	A	A
Ghost crab ( <u>Ocypode quadrato</u> )	C	C	C	C
Common fiddler crab ( <u>Uca pugilator</u> )	A	A	A	A
Brown shrimp ( <u>Panaeus axtectus</u> )	A	A	A	A
Pink shrimp ( <u>Panaeus duorarum</u> )	A	A	A	A